An application of factor analysis on a 24-item scale on the attitudes towards AIDS precautions using Pearson, Spearman and Polychoric correlation matrices

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Keywords

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Principal components factoring
Varimax rotation
Pearson correlation
Spearman correlation
Polychoric correlation

List of Abbreviations

UWC	University of Western Cape
HIV	Human Immuno-deficiency Virus
AIDS	Acquired Immune Deficiency Syndrome
ZAWECA	University of Zambia and University of Western Cape (peer-Education Project).
PCF	Principal components factoring
PAF	Principal axis factoring
ML	Maximum likelihood factoring
CCT	Classical test theory
IRT	Item response theory
RMSR	Root mean square residual
KMO	Kaiser-Meyer-Olkin

Declaration

I declare that An application of factor analysis on a 24-item scale on the attitudes towards AIDS precautions using Pearson, Spearman and Polychoric correlation matrices is my own work, that it has not been submitted for any degree or examination in any other university, and that all the sources I have used or quoted have been indicated and acknowledged by complete references.

Mohammed Babekir Elmalik Abdalmajid **May 2006**

Signed: …….

Abstract

An application study based on a sample of 334 heterosexual students aged from 16 to 24 years from University of the Western Cape (UWC) in South Africa was undertaken to investigate the influence of the correlation matrix on factor analysis results.

The 24-item scale was derived by Moore and Rosenthal in 1991 with four subscales of attitudes towards AIDS precautions namely: *Antiprecaution*, *Abrogation of Responsibility*, *Denial of Risk* and *Fatalism*. Each subscale consisted of six items.

The Pearson, Spearman and Polychoric correlation matrices were used on the 24-item scale on the attitudes towards AIDS precautions to construct factor models. The three factor models were different with respect to the explained variance and the distribution of the 24-items in the factors. The number of factors retained were kept constant. Eight factors were retained in the three models. The Polychoric model explained 62% of the variance among the 24-item scale but the Spearman and Pearson models explained 57% and 54%, respectively. The Polychoric factor model resulted in the best factor model to explain the variance among the 24-item scale.

Results indicated that different types of correlation matrices influence the factor analysis results with regards to the explained variance and the distribution of the items in the factors. The Polychoric correlation matrix should be used when the items are based on ordered categories.

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Dedication

This research project dedicated to my mother and the memory of my father.

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Chapter One

Introduction

1.1. Introduction

Acquired Immuno deficiency Syndrome (AIDS) has killed more than 25 million people in the world since it was first recognized in 1981 making it one of the most devastating destructive epidemics. Sub-Saharan Africa has just over 10% of the world's population, but is home to more than 60% of all people living with HIV. South Africa has one of the highest HIV prevalence rates (21.5%) in the world (UNAIDS, 2004).

The first cases of the disease in South Africa were in the eighties of the previous century where the first cases of HIV were diagnosed and recorded in the year 1982 (Berry, S. 2004).

Heterosexual transmission has been identified as one of the means that causes rapid transmission of the pandemic in South Africa among adolescents and young adults. Numerous studies have indicated that adolescent sexuality in South Africa is characterized by behaviours and attitudes that contribute directly to the HIV transmission (Vergnani, 2003).

Young people are the most affected by the HIV/AIDS pandemic. Half of all new adult infections occur among young people aged 15-24 years (UNICEF, 2003). A typical example of this is students going to university for the first time and many of them leave home for the first time and they get more freedom in their new life on campus.

One of the most important activities of the UWC HIV&AIDS programme is to ensure that the first-year students have correct and adequate information about HIV and AIDS. (UWC HIV&AIDS programme, 2003). Changing the first year students' behaviour and attitudes with more knowledge about HIV/AIDS is playing an important role to prevent new HIV infections among these students.

This research project focused on the attitudes towards AIDS precautions among students and is part of a joint peer-education Project at the University of Zambia and the University of the Western Cape (ZAWECA). The project investigated the HIV/AIDS-related knowledge,

attitudes and sexual behaviour among first entering first-year students (2005) (Vergnani *et al*., 2005).

The attitudes towards AIDS precautions have been analyzed by a 24-item scale. The 24-item scale was derived by Moore and Rosenthal in 1991, the 24-item scale consists of 24 items to which respondents replied using a four point scale (0= strongly disagree, 1= disagree, 2= agree and 3= strongly agree). The scale consists of four 6-item subscales which assess different types of attitudes toward AIDS precautions; the *Fatalism* subscale contains items such as: "There is a chance I could get AIDS I suppose, but that's life – there's not much I can do about it". The *Antiprecaution* subscale contains items such as: "AIDS precautions are a nuisance - I could not be bothered taking any precautions". The *Abrogation of Responsibility* subscale contains items such as: "A person's sexual partner should be responsible for initiating the use of condoms"; and the *Denial of Risk* subscale contains items such as: "The possibility of me catching AIDS is something I have never really thought about" (Moore and Rosenthal, 1991).

The *Antiprecaution* subscale describes negative attitudes towards the use of safe-guards against AIDS, such as condoms. The *Denial of Risk* subscale represents an attitude that "it can not happen to me and any of my family members", which may or may not be realistic depending on behaviours engaged in. The *Abrogation of Responsibility* refers to which number may see the danger associated with difficulty to think or talk about their sexual-taking behaviour. Finally, the *Fatalism* subscale describes an attitude of powerlessness towards AIDS precautions (Moore and Rosenthal, 1991) (see Appendix (A), Table 1).

It can clearly be seen that the items were designed so that higher numbers reflect negative attitudes toward AIDS precautions and lower numbers reflect positive attitudes.

1.2. Research Problem

"The essential purpose of factor analysis is to describe, if possible, the correlation relationships among many variables in terms of a few underlying, but unobservable, random quantities called factors" (Johnson & Wichern, 2002:477). Factor analysis is a technique that could be used to reduce the data when the data reduction is needed by using the correlation among the variables in the data. However, evidence available shows researchers have used factor analysis to evaluate questionnaires and to explore or confirm what is already known theoretically (Moore & Rosenthal, 1991; Akande, 1997 & 2001; Smith *et al*., 1998).

The researcher would need to test which correlation structure is best suited for the application. When the best suited correlation matrix has been determined, the results should be verified by using re-sampling or bootstrapping to validate the results.

There is an overuse of factor analysis and the Pearson correlation matrix in literature (Moore & Rosenthal, 1991; Akande, 1997 & 2001; Smith *et al*., 1998). The Pearson correlation requires that the data must only be interval scaled. The 24-item scale and its subscales (*Antiprecaution*, *Abrogation of responsibility*, *Denial of risk* and *Fatalism*) are well designed but the literature reveals that confirmatory factor analysis was conducted on the ordinal 24-item scale using a Pearson correlation matrix.

1.3. Research objectives

The main aim of this research project is to explore the 24-item scale of attitudes towards AIDS precautions using exploratory factor analysis. The study will specifically study the following:

1) Explore the correlation among the 24-item scale of the attitudes towards AIDS precautions and determine any new factor structure.
2) If a new hidden factor structure of the 24-item scale could be determined it would need to be compared to structures reported in the literature.
3) Investigate how different correlation matrices influence the factor analysis results.

1.4. Research question

The research question to be investigated statistically is: Is there any other new hidden structure recognisable in the 24-item scale to AIDS precautions?

1.5. Significance of the study

The 24-item scale has been used extensively to assess the attitudes towards AIDS precautions. This study will investigate the usefulness and validity of the instrument in a South African setting, fourteen years after the development of the instrument. If a new structure could be found statistically, the HIV/AIDS prevention strategies could be more effective in aiding campaigns to change attitudes and the sexual behaviour.

1.6. Methodology

The first time entering first-year students (full-time) at University of the Western Cape (UWC) for 2005 was the target population; the number of the registered students for the first

time for the first-year was 2553 (Vergnani *et al*., 2005). A sample was collected from the population target during the orientation week. This study is based on the sample that described themselves as heterosexuals and were aged from 16 to 24 years. The term heterosexual refers to "*a person who is sexually attracted to people of the opposite sex"* (Cambridge Dictionary of American English). A stratified sample by faculty, sequential on orientation groups, was drawn (Vergnani *et al*., 2005).

Factor analysis was used to answer the research question. Different correlation matrices such as: Pearson, Spearman and Polychoric were used to conduct the factor analyses to see how different types of correlation matrices influence the factor analysis results. Data used for this project was collected by the ZAWECA study for the first entering first-year students at UWC during 2005 (Vergnani *et al*., 2005). Statistical analyses are conducted by using statistical packages such as SAS 9.1, SPSS 13.0 and LISREL 8.7.

1.7. Research framework

The researcher assumed no theoretical knowledge about the factor model that is responsible for the correlations among the 24-item scale towards AIDS precautions. Factor analysis methods were used to explore new factor models for the 24-items. The researcher conducted the factor analysis using one exploratory factor analysis technique and using three types of correlation matrices.

It is necessary to know the demographic properties of the students, background of their sexual behaviour and study the attitudes towards AIDS precautions using the four subscales (*Antiprecaution*, *Abrogation of Responsibility*, *Denial of Risk and Fatalism*). If new subscale groupings of items could be found the new model were to be investigated for validity and usability.

1.8. Conclusion

This study is an application study aiming to show how different types of correlation matrices influence the factor analysis results and to indicate the overuse of the Pearson correlation matrix in the literature. The study used 334 heterosexual students aged from 16 to 24 years to apply the factor analysis on the 24-item scale.

The first chapter introduced the aim of the research project and stated the framework of how the research question will be approached.

The second chapter includes a summary of recent findings from the literature, clarifies the key concepts and provides an overview of the main points that have emerged from the literature. Chapter three describes the research design and methodology. In this chapter the researcher articulates the research hypotheses and instruments used in data collection and analysis. In addition, the sample design, data collection process and data editing is described. The main results are presented in the fourth chapter. The conclusions, important recommendations and the comparison between the research findings and the literature reviews are presented in Chapter five.

Chapter Two

Literature reviews

2.1. Introduction

In this chapter key research concepts regarding factor analysis and the 24-item scale and the Moore & Rosenthal (1991) subscales are clarified. Starting with the first use of the 24-item scale and moving on to the various studies that have used the 24-item scale to measure the attitudes towards AIDS precautions.

2.2. What is factor analysis?

Suppose variables can be grouped by their correlations and suppose all variables within a particular group are highly correlated among themselves, but have relatively small correlations with variables in a different group. Then it is conceivable that each group of variables represent a single underlying construct, or factor, that is responsible for the observed correlations (Johnson & Wichern, 2002:477).

Factor analysis can be classified as exploratory or confirmatory. In exploratory factor analysis the researcher has little or no knowledge about the factor structure. On the other hand confirmatory factor analysis assumes that the factor structure is known or hypothesized a priori. The principal components factoring (PCF) and principal axis factoring (PAF) are the most popular estimation techniques for exploratory factor analysis and the maximum-likelihood (ML) estimation technique is the most popular technique for confirmatory factor analysis (Sharma, 1996:102).

The 24-item scale is designed to measure the attitudes towards AIDS precautions and as such it is assumed, in the research hypothesis, that there is a correlation among the 24-items.

2.3. Exploratory factor analysis using different correlation matrices

There are quite a number of available choices to characterize the relationships between the variables. The Pearson correlation matrix is the most common correlation matrix used in exploratory factor analysis. The Pearson correlation matrix requires that the data must be interval scaled. This is the exact opposite of the Spearman correlation matrix which calculates correlations for ordinal scaled data (Thompson, 2004:29).

Polychoric correlation is based on the assumption that the response categories are actually proxies for unobserved, normally distributed variables. Factor analysis using the Polychoric matrix is essentially a factor analysis of the relations among latent response variables that are assumed to be continuous and normally distributed (Panter *et al*., 1997).

The factor solution is not unique, another solutions can be obtained by rotation of the factor axes (Sharma, 1996:119). It is usual practice to rotate the factor solution until a "simple structure" is achieved. The rationale is very similar to sharpening the focus of a microscope in order to see the results more clearly (Johnson & Wichern, 2002:501).

The Varimax rotation is the most common method of the orthogonal rotation methods. Orthogonal means that the factors will remain "orthogonal" or uncorrelated after the rotation (Thompson, 2004:42).

2.4. The 24-item scale

In 1991, Moore and Rosenthal derived the 24-item scale with four *subscales* of attitudes towards AIDS precautions namely: *Antiprecaution*, *Abrogation of Responsibility*, *Denial of Risk* and *Fatalism*. They used these subscales to assess the attitudes towards AIDS precautions within the Australian population and this indicated that the various dimensions of attitudes (*Antiprecaution*, *Abrogation of Responsibility*, *Denial of Risk* and *Fatalism*) are related to gender and sexual risk-taking behaviour (Moore and Rosenthal, 1991).

2.5. Uses of the 24-item scale

In order to assess the attitudes towards AIDS precautions, few authors have used the 24-item scale for this purpose. Moore and Rosenthal found that, males were more likely, when compared to females, to express *Antiprecaution* attitudes. Males scored higher on the *Abrogation of Responsibility* subscale. There were no gender differences on *Risk Denial* or *Fatalism* (Moore and Rosenthal, 1991).

Akande (1997) used the Moore and Rosenthal subscales to assess different types of attitudes and he found that in comparison to females, males were more likely to express *Antiprecaution* attitudes and scored higher on the *Abrogation of Responsibility* subscale, but there were no gender differences on the *Denial of Risk* or *Fatalism* subscales (Akande, 1997).

Smith *et al*. (1998) used the 24-item scale to understand safe sexual behaviour in South Africa and Australia. He found that in both South Africa and Australia, females were less likely, when compared to males, to score high on the *Antiprecaution* subscale. Females were less likely to deny the threat of HIV/AIDS, abrogate responsibility of HIV/AIDS and to express a fatalistic attitude toward HIV/AIDS (Smith *et al*., 1998).

Akande used the Moore and Rosenthal subscales again and he found that males were more likely to score higher than females on the *Antiprecaution* and *Abrogation of Responsibility* subscales, but no significant differences on the *Denial of Risk* or *Fatalism* (Akande, 2001) were found.

2.6. Factor analysis conducted on the 24-item scale

In 1991, Moore & Rosenthal used a pilot sample of 117 young heterosexual adults and an actual sample of 1006 young heterosexual adults to test the 24-item scale. When the pilot sample was used, confirmatory factor analysis with a Varimax rotation confirmed four factors accounting 40.3% of the variance among the 24-items. The four factors represented the *Antiprecation*, *Abrogation of Responsibility*, *Denial of Risk*, and *Fatalism* subscales. The alpha reliability coefficients of these subscales were 0.78, 0.75, 0.56 and 0.53 for *Antiprecation*, *Abrogation of Responsibility*, *Denial of Risk* and *Fatalism*, respectively.

When the actual sample of 1006 was used, confirmatory factor analysis confirmed the hypothesized four factors with the Varimax rotation. A solution accounted for 40.1% of the total variance among the 24-item scale. Moore and Rosenthal removed two items to enhance the consistency within the subscale items, one item from the *Denial of Risk* subscale and the other one from the *Fatalism* subscale. The alpha reliability coefficients were then 0.74, 0.63, 0.63 and 0.53, respectively (Moore and Rosenthal, 1991).

In 1997, Akande conducted a study on black South African adolescents' attitudes towards AIDS precautions. He used the Moore and Rosenthal subscales to assess different types of attitudes and he investigated the correlations among the 24-items using factor analysis.

Akande applied an exploratory factor analysis on the 24-item scale using maximum likelihood estimation, which is a confirmatory technique. A solution obtained four factors and explained 39.3% of the variance among the 24-item scale. He found an internal consistency within the *Antiprecaution* and the *Abrogation of Responsibility* subscales (0.81 and 0.73, respectively)

but the internal consistency was not acceptable for the *Denial of Risk* and *Fatalism* subscales (0.58 and 0.57, respectively) (Akande, 1997).

Akande has used a confirmatory factor analysis in the same study (1997) to confirm the four factors (*Antiprecaution*, *Abrogation of Responsibility*, *Denial of Risk* and *Fatalism*), a solution accounted for 40.1% of the variance among the 24-item scale (Akande, 1997).

Smith *et al*. found a clear interpretable structure in a study conducted in 1998 for the 24-item scale of attitudes towards AIDS precautions after using a factor analysis and the Varimax rotation. He found that the 24-item scale had four factors responsible for the variance between the items, which were *Antiprecaution*, *Abrogation* of *Responsibility*, *Denial* of *Risk* and *Fatalism* (Smith *et al*., 1998).

In 2001, Akande used factor analysis on the 24-item scale as a confirmatory analysis to confirm the four subscales again (*Antiprecaution*, *Abrogation of responsibility*, *Denial of risk and Fatalism*), a solution explained 40.3% of the variance. He used the four subscales in a study called: "Risky Business: South African youths and HIV/AIDS prevention" to asses the attitudes to AIDS precaution and then investigated the relationship between the sexual risk behaviour and attitudes towards AIDS precautions (Akande, 2001).

2.7. The gap between the literature and this research project

It can be seen that the *Fatalism* subscale was somewhat lower than would normally be accepted regarding to the reliability coefficients but it was included because of its conceptual importance in the Moore and Rosenthal study (1991). According to the reliability coefficients, the *Denial of Risk* and the *Fatalism* subscales were lower than would normally be accepted but were also included due to the conceptual importance (Akande, 1997).

There is no mention of which factor analysis technique or which correlation matrix Moore & Rosenthal used in 1991. It could be assumed that the Pearson correlation matrix was used as no correlation matrix is specifically mentioned and the Pearson correlation matrix is normally the default option.

In 1997, Akande conducted an exploratory factor analysis using the maximum likelihood technique on a Pearson correlation matrix, which is a confirmatory technique. The maximum

likelihood technique assumes normality of the data, but no mention of the normality of the data was provided when the factor model was constructed.

Factor analysis procedures, such as PCF, PAF and ML, only produce meaningful and reliable results if the data are normally distributed and are truly continuous. Item-level data (ordinal) almost never meet these requirements. Dichotomous items (e.g. true or false) and Likert scales (e.g. with 4 ordered response options) are also not suited where techniques require the assumption of normality (Bernstein & Teng, 1989).

When the items are based on ordered categories (e.g. strongly disagree, disagree, agree and strongly agree), factor analysis should be conducted on the polychoric inter-item correlation matrix rather than on the Pearson correlation matrix (Panter *et al*., 1997).

2.8. Conclusion

Males generally reported their first sexual intercourse at an earlier age comared to females. Moore & Rosenthal (1991) and Akande (1997; 2001), concluded that males were more likely to score higher than females on the *Antiprecaution* and *Abrogation of Responsibility* subscales but no significant gender differences were found for *Denial of Risk* or *Fatalism*. Smith *et al*. (1998) found that females were less likely to score high on all of the subscales compared to males.

The reliability coefficients that had been reported in the Moore and Rosenthal study in 1991 and the Akande study in 1997 indicated that 0.60 was used as cut-off for the reliability coefficient to determine the internal consistency. In both the studies the items in the *Fatalism* subscale were not consistent. In the Akande study (1997) the reliability coefficient for the *Denial of Risk* subscale was also lower than 0.60, but both the *Fatalism* and the *Denial of Risk* subscales were included because of their conceptual importance.

Factor analysis on the 24-item scale that was conducted in previous studies represented approximately 40% of the variance among the 24-item scale. Although maximum likelihood is a confirmatory technique, Akande used it in exploratory factor analysis in 1997.

The researcher will apply exploratory factor analyses using three types of correlation matrices to explore the relationship among the 24-item scale. Principal components factoring is the most common exploratory technique and will be used to calculate the factor models.

The next chapter describes the research design and methodology. Full details about the sample design and data collection will be given and a brief summary of research hypothesis and research instruments will be provided.

Chapter Three

Research Design and Methodology

3.1. Introduction

This chapter contains seven sections, the first section is an introduction. In the second section the researcher articulates the research hypothesis, explains the key concepts and displays the variables that were used. The research instruments are discussed in section three followed by an explanation why the researcher chose these instruments. The sample design and sampling techniques used to collect the data are explained in the fourth section. The data editing process and some measures used to minimize the errors in the data is described the fifth section. Section seven concludes the chapter with a discussion of the possible limitations of the study.

3.2. The research hypothesis, key concepts and variables

In this section the research hypothesis is given, the key concepts are explained and the variables that were used in the analysis will be discussed.

3.2.1. Research hypothesis

The type of the correlation matrix influences the factor analysis results. Three correlation matrices were used to test this research hypothesis.

3.2.2. Key concepts

3.2.2.1. Heterosexual group

As defined in Chapter 1, the term heterosexual refers to "… a person who is sexually attracted to people of the opposite sex" (Cambridge Dictionary of American English). The sexual active group included students who have had either vaginal, oral or anal sex.

3.2.2.2. The Moore & Rosenthal subscales

Moore & Rosenthal subscales used refer to the subscales of the attitudes towards AIDS precautions (*Antiprecaution*, *Denial of Risk*, *Abrogation of Responsibility and Fatalism*).

3.2.3. The research variables

The data consists of 47 variables, 43 were questions from the original questionnaire and 4 were new transformed variables created from the original variables for analysis purposes. See copy of the original questionnaire in Appendix (B).

3.2.3.1. Variables in the questionnaire

The 24-item scale, in the original questionnaire consisted of 24 items to which respondents replied using a four-point scale (1= strongly agree, 2= agree, 3= disagree and 4= strongly disagree). These codes are not consistent with Moore and Rosenthal codes therefore the 24-items scales were rescored so that higher numbers reflect negative attitudes toward AIDS precautions and lower numbers reflect positive attitudes to make the study consistent with the other studies that have been found in the literature. Table 3.1 displays the 24-item scale on the attitudes towards AIDS precautions and their subscales according to the Moore and Rosenthal subscales.

Table 3.1: The 24-item scale to AIDS precautions and their subscales (Moore and Rosenthal, 1991)

Subscale	Items
Antiprecaution	Q60. AIDS precautions are a nuisance – I couldn't be bothered taking any precautions. Q63. I have tried taking precautions against AIDS but I find it difficult. * Q65. Putting on a condom need not interfere with sexual pleasure. Q67. Condoms are a nuisance. Q70 It's a good idea to take precautions against AIDS but it can have a bad effect on people's sex lives. Q79. AIDS is a worry but I don't like the thought of using a condom.
Denial of Risk	Q64. I might get around to taking AIDS precautions one day but I haven't yet. Q68. None of my friends are the kind of people who would be AIDS carriers, it's just not an issue with me. Q69. The possibility of me catching AIDS is something I've never really thought about. Q76. I do not intend to have sexual intercourse until I am in a long lasting relationship, so AIDS is not a threat. Q77. Using condoms is not the way to control AIDS, self-control is the answer. Q81. If people followed traditional moral codes (e.g. one partner of the opposite sex), they would have nothing to fear from AIDS.
Abrogation of responsibility	Q61. If I talk about AIDS with a sex partner they might be insulted. Q73. It is up to a woman to speak up if she wants a man to use a condom. Q74. I'd like to discuss AIDS precautions with a partner but I wouldn't be able to bring up the subject. Q75.Taking measures against AIDS could seem like an insult to a sex partner. * Q78. I've thought about AIDS and believe it's something I will need to discuss with my partner. Q82. I know I should think about taking measures against AIDS, but as yet I haven't worked out what I will do about it.
Fatalism	Q59. It's hard to know what to think about AIDS – even the experts don't agree. Q62. Apart from a few innocent people, those who get AIDS are only getting what they deserve. Q66. Part of me understands the AIDS risk, but another part of me can't accept that possibility. * Q71. As a result of the AIDS threat, I have resolved to be more responsible in my approach to sex. Q72. Life is full of risks and AIDS is just an example: if you don't take risks you don't have fun. Q80. There is a chance I could get AIDS I suppose, but that's life – there's not much I can do about it.

*Questions used in reversed order

Reversal of values for the stared items (*) was done. The reason for reversal of these three items is to make these items consistent with other items (higher numbers reflect negative attitudes toward AIDS precautions and lower numbers reflect positive attitudes).

The researcher selected the following 5 variables to reflect the respondents' demographic properties: gender, age, marital status, home language and religion (questions 1, 2, 3, 5 and 10, respectively).

Furthermore fourteen variables were selected from the original questionnaire to indicate the sexual background behaviour (see Table 3.2).

Table 3.2: The sexual background questions

	The question
1	Q4 Do you personally know anyone with HIV/AIDS?
2	Q12 Have ever had vaginal sex?
3	Q13 How old were you when you first time had vaginal sex?
4	Q15 How often do you use condoms when you have vaginal sex?
5	Q16 Have you ever had oral sex?
6	Q18 Do you think you can contract HIV from oral sex?
7	Q19 How often do use protection (condoms/barrier) when you have oral sex?
8	Q20 Have you ever had anal sex?
9	Q22 Do you think you can contract HIV from anal sex?
10	Q23 How often do you use condoms when you have anal sex?
11	Q25 How many sexual partners have you had in the last 12 months?
12	Q26 Have you ever discussed condoms with a sexual partner?
13	Q27 Have you ever forced someone to have sex?
14	Q28 Have ever been forced to have sex?

Only some of the demographic and sexual background questions from the original questionnaire were selected for this research project.

3.2.3.2. Variables not in the questionnaire

The researcher created four new variables from the original variables in the questionnaire; the new variables are the subscales of the attitudes to AIDS precautions: *Antiprecaution*, *Denial of Risk*, *Abrogation of Responsibility* and *Fatalism*.

These subscales were first defined and used by Moore and Rosenthal (1991) when they used these subscales to investigate the relationship between the attitudes to AIDS precautions and safe and unsafe practices among a sexually active group.

The *Antiprecaution* subscale is equal to the sum of all the *Antiprecaution* items in the questionnaire; the *Denial of Risk* subscale is equal to the sum of all the *Denial of Risk* items in the questionnaire and so on.

3.3. The statistical methods

Classical test theory (CTT) is a theory that assists in developing questionnaires in the hope of obtaining instruments that are reliable and valid. CCT provides the methodology to derive reliability coefficients, assess individual item properties and compute scale scores (Bryce, B. R. & Louise, C. M., 2004:247-248). Classical test theory methods such as: Cronbach's alpha coefficient is used to evaluate the overall consistency of the items and assess the individual item properties.

Factor analysis is used to explore a new structure of the 24-item scale. T-test and One-way ANOVA are used to investigate the attitudes towards AIDS precautions using the Moore and Rosenthal subscales. Gender comparisons are tested by T-tests. One-way ANOVA is used to compare more than two means such as: home languages and religion.

3.3.1. The factor analysis techniques that will be used

The principal component analysis is used to conduct the factor analysis because it is the widely used method of exploratory factor analysis. The type of correlation matrix used is crucial for factor analysis. Three types of correlation matrices: Pearson, Spearman and Polychoric will be used to conduct the factor analysis.

Determining the number of factors to retain, rotation of the factor solution and investigation of its goodness are the major targets of the factor analysis in this research project.

To determine the number of factors to retain the eigenvalue-greater-than-one criterion will be used for this purpose. In 1954 Guttman reasoned that noteworthy factors should have eigenvalues greater than 1. Factors, by definition, are latent constructs created as aggregates of measured variables and so should consist of more than a single measured variable. If a factor consisted of a single measured variable the factor would have an eigen value of 1 (Thompson, 2004:32).

As mentioned in Chapter two, the factor solution is not unique, another solution can be obtained by rotation of the axes. The Varimax rotation, as rotation method, seeks to have a factor structure in which each variable loads highly on one and only one factor (Sharma, 1996:119).

To see how well the factors can account for the correlation among the 24-item scale, the residual correlation matrix is used. The residual matrix can be summarized by computing the square root of the average squared values of the off diagonal elements. This quantity is called the root mean square residual (RMSR) and should be small for a good factor structure (Sharma, 1996:118).

3.3.2. Rationale for factor analysis

This research project aims to find the underlying variable structure or factors that are responsible for the observed correlations among the 24-item scale on the attitudes towards AIDS precautions. A method suited to accomplish this is factor analysis.

3.4. Sample method, design and techniques

The first time entering first-year students (full-time) at UWC for 2005 who were attending the orientation week were the target population, there is no information about the number of students who attended the orientation week but the number of students who registered for the first time for the first-year were 2553 students and 70% of students attending the compulsory orientation was selected (Vergnani *et al*., 2005).

3.4.1. Sample method

To ensure that all the first time entering first-year students have adequate information about HIV and AIDS to protect themselves from infection is part of UWC's prevention strategy. A two hour workshop is presented to all first-year students during their orientation week. The workshop focuses on the facts of HIV/AIDS, informing the students about the services on campus (e.g. condoms, free HIV testing…). Furthermore students are encouraged to go for an HIV test and to know their HIV status (UWC HIV&AIDS programme, 2003).

3.4.2. Process of data collection and sample size

All first year students who attended the orientation programme were divided into small groups of approximately 30 each according to their faculty. A total of 974 students completed the pre-intervention questionnaire before the HIV/AIDS workshop (Vergnani *et al*., 2005).

3.4.3. Sampling techniques

A stratified sequential sample was drawn from all full-time first-year students who were attending the first-year 2005 orientation program at UWC. For the sampling procedure the first-year population was stratified into the different faculties, and approximately 70% of the

groups from each faculty were sequentially sampled from the lists provided by the organiser of the first-year orientation programme (Vergnani *et al*., 2005).

3.5. Data-editing

A sub-sample of the data was used for this study. Students aged from 16 to 24 years who were sexually active and unmarried were included. As this study only targets young people only the students aged from 16 to 24 years were included. The married students were excluded from the sample as they have sexual practices different from younger or unmarried students. Microsoft excel was used for data entering and SAS 9.1 was used for data cleaning and analyses.

3.6. Measures used to minimize the errors

The data cleaning process was used to check for errors because some questions showed inconsistent answers to the questions on sexual behaviour (e.g. a student indicated that he/she never had anal sex in one question but indicated how often he/she used condoms when having anal sex). All responses that showed inconsistent answers were removed as well as students with unknown sexual status.

Missing values occurred for some variables. For analysis reasons the missing values that appeared in the 24-items were imputed. Since the 24-item scale on the attitudes towards AIDS precautions are ordinal, the mode was used to replace all the missing values on attitude items.

A final total of 334 students were used for analyses purposes. To enhance the reliability of the responses of the questions, the participation was voluntary and the questionnaire was anonymous (Vergnani *et al*., 2005).

3.7. Discussion of the possible limitations, gaps in the data.

The sample was drawn from the students who attended the orientation week and who only registered at that time. The sample did not include students registering late (Vergnani *et al*., 2005).

In Chapter four the main research findings will be discussed. The actual sample will be described, negative attitudes towards AIDS precautions will be investigated and the factor analyses of the 24-item scale will be constructed.

Chapter Four

Research findings and discussion

4.1. Introduction

The main results are presented in this chapter, the chapter is divided into six sections, the first section is the introduction, the second and third sections describe the characteristics of the actual sample and the 24-item scale. The fourth section investigates the negative attitudes towards AIDS precautions. The fifth section shows the factor analyses of the 24-item scale and lastly the researcher concludes with a summary of the main results that have emerged in section six.

4.2. The actual sample and its characteristics

This section describes the characteristics of the respondents. The data contains two parts; the first part is a summary of the demographic properties of the respondents and the second part is a brief descriptive of the sexual behaviour background of the respondents.

4.2.1. Demographic properties of the respondents

The final sample consisted of only the participants who described themselves as heterosexuals. There were 334 unmarried heterosexual volunteers aged form 16 to 24 years from the first-time entering first-year students participating in this study. The sample consisted of 191 females and 143 males (57.2% and 42.8%, respectively) (see Figure 4.1).

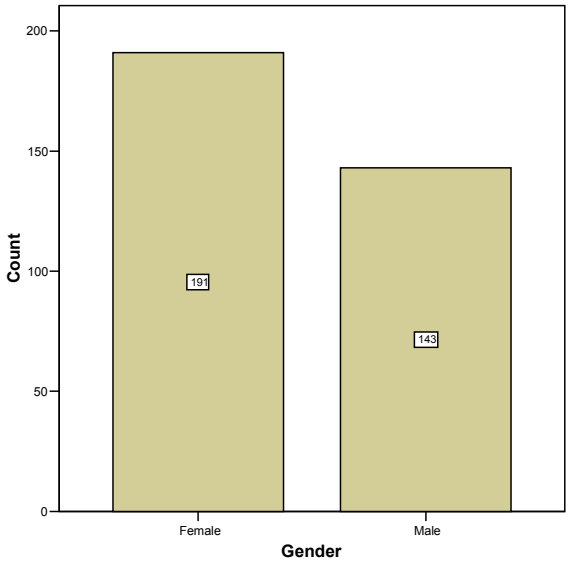

Figure 4.1: The Gender distribution.

The home language was distributed as follows: 40% spoke English; 25% Xhosa; 23% Afrikaans and 7% other languages. Five percent did not indicate their home language (see Figure 4.2).

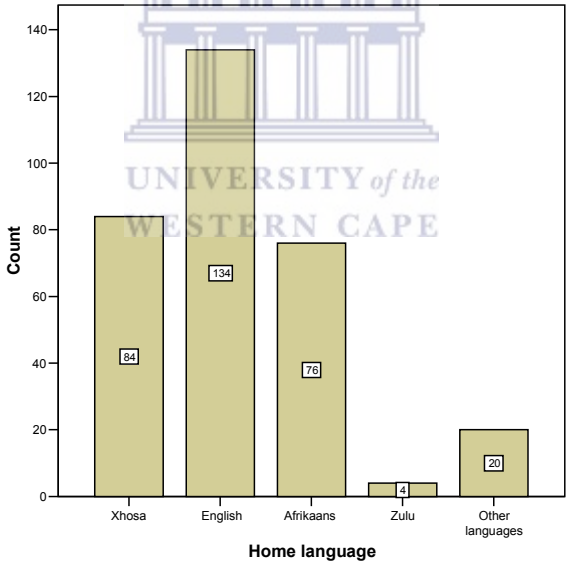

Figure 4.2: The home language distribution.

The religion was distributed as follows: 85% were Christians; 5% were Muslims; 5% were from other religions and 4% indicated traditional religions. One percent did not indicate their religion.

4.2.2. Sexual behaviour background

When asked about the number of sexual partners in the last 12 months, both males and females reported a mode of one. When investigating the average, males reported significantly more sexual partners in the last 12 months (1.7) compared to females (1.3) (T-test = -4.601; $p<0.01$) (see Appendix (C), Table 2). The researcher will compare the behaviour of males and females to see whether there are differences in the behaviours or not using the Moore and Rosenthal subscales (*Antiprecaution*, *Denial of Risk*, *Abrogation* of *Responsibility* and *Fatalism*).

Eighty-seven percent of the students discussed condom usage with their sexual partners occasionally and 13% percent never discussed condoms with their partners. Eighty-nine percent indicated that they have had vaginal sex. Sixty-eight percent indicated that they often had sex, whereas 30.7% occasionally had sex. Sixty percent indicated that they always used a condom, 28% used condoms occasionally and 10.5% never used condoms.

Fifty-three percent indicated that they have had oral sex. Fourteen percent indicated that they always used a condom, 16.7% used condoms occasionally and 68.9% never used condoms during oral sex. Sixty-nine percent thought that a person could contract HIV from oral sex. Sixty-seven percent of the students, who knew that a person could contract HIV from oral sex, never used a condom when they had oral sex. Only 2.7% students had forced someone to have sex but 11.7% had been forced to have sex. Thirty-five percent of the students personally knew someone with HIV/AIDS. Only 7.8% indicated that they have had anal sex.

In the next section the properties of the 24-item scale will be investigated.

4.3. The 24-item scale and its characteristics

This section evaluates the 24-item scale properties using three subsections, the first subsection evaluates the overall consistency of the 24-items by assessing individual item properties, and the second subsection describes the Moore & Rosenthal subscales (*Antiprecaution*, *Denial of Risk*, *Abrogation of Responsibility* and *Fatalism*). In subsection three the evaluation of the normality of these new variables will be presented.

4.3.1. Evaluating item properties

Cronbach's Alpha coefficients measure the overall consistency within item groups. The coefficient with an item removed indicates how internal consistency changes when that item

is removed from the scale. The widely acceptable cut-off of Cronbach's Alpha coefficient in social sciences is 0.70 and greater (Bryce, B. R. & Louise, C. M., 2004:262).

Cronbach's Alpha coefficient was equal to 0.66 within all the 24-items as a general measure of the attitudes towards AIDS precautions. Cronbach's Alpha coefficients for the Moore & Rosenthal subscales were as follows: 0.61, 0.41, 0.58 and 0.37 for the *Antiprecaution*, *Denial of Risk*, *Abrogation of Responsibility* and *Fatalism*, respectively (see Appendix (D), Tables 1 to 4).

The internal consistency within all the 24-items is slightly lower than the accepted 0.70 and there is low internal consistency within each Moore & Rosenthal subscale according to the widely acceptable cut-off point of 0.70.

4.3.2. Descriptive statistics of Moore & Rosenthal subscales

According to the definitions of the new variables that had been created in the third chapter (Table 3.1) using the 24-item scale of attitudes and subscales, Table 4.1 displays descriptive statistics of the new variables.

Table 4.1: Descriptive statistics of Moore & Rosenthal subscales

Attitude scale	Mean	Std. Deviation	Median	Interquartile Range	Range	N
Antiprecaution	4.26	3.02	4.00	4.00	14.00	334
Denial of Risk	7.25	2.97	7.00	4.00	15.00	334
Abrogation of Responsibility	5.26	3.23	5.00	4.00	14.00	334
Fatalism	5.15	2.59	5.00	4.00	13.00	334

Table 4.1 shows that the subscale variables did not have a large spread. The means were almost equal to the medians, which indicates that the observations were distributed approximately symmetrically.

4.3.3. Evaluating the normality of the Moore & Rosenthal subscales

One of the research objectives is to assess the attitudes towards AIDS precautions and find logical reasons for the negative attitudes using Moore & Rosenthal subscales and the demographic properties and sexual behaviour of the participants. Therefore it is necessary to evaluate the normality of these newly created subscale variables.

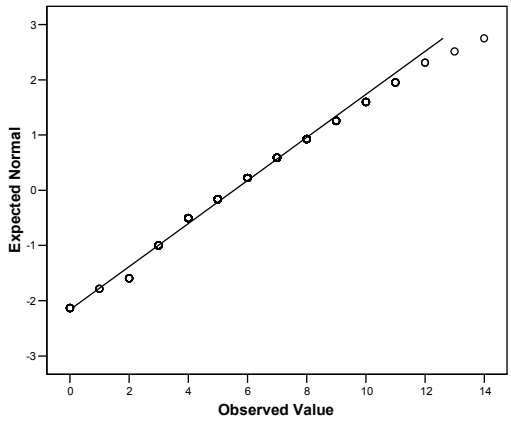

Figure 4.3: Normal Q-Q Plot of *Antiprecaution*.

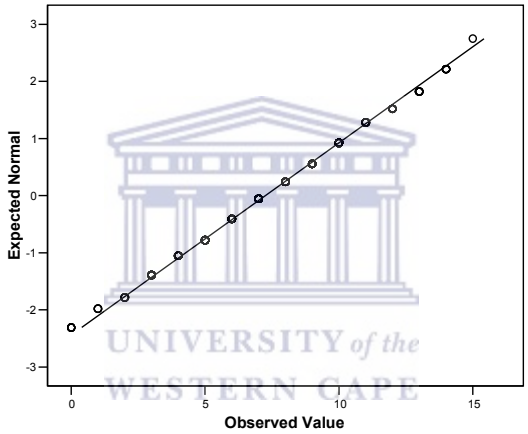

Figure 4.4: Normal Q-Q Plot of *Denial of Risk*.

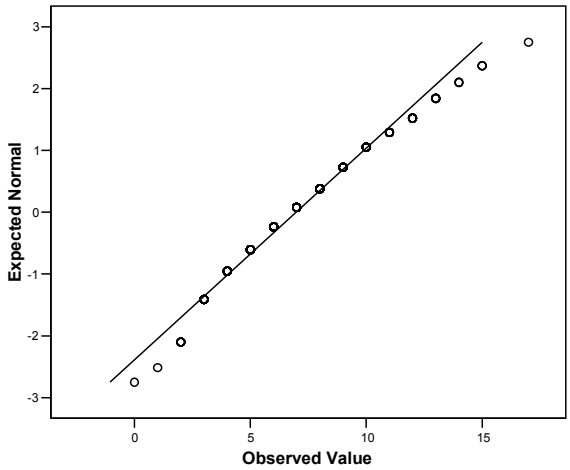

Figure 4.5: Normal Q-Q Plot of *Abrogation of Responsibility*.

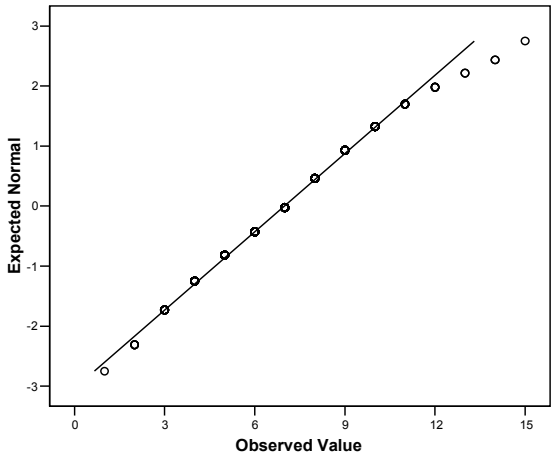

Figure 4.6: Normal Q-Q Plot of *Fatalism*.

Figures 4.3 to 4.6 illustrate the acceptable normal distributions. Correlation coefficients can also measure the straightness of the Q-Q plots by using the Shapiro & Wilk statistics (Johnson & Wichern, 2002:183). The Shapiro & Wilk statistics were 0.973, 0.985, 0.971 and 0.980 for *Antiprecaution*, *Denial of Risk*, *Abrogation of Responsibility and Fatalism*, respectively. All the correlations are highly significant, $p<0.01$ which indicates that statistical analyses that require the normality assumption can therefore applied (see Appendix (E), Table 1).

The next section presents an investigation of the causes of negative attitudes towards AIDS precautions using the Moore & Rosenthal subscales.

4.4. Causes of negative attitudes using the Moore & Rosenthal subscales

In this section the researcher investigates the causes of negative attitudes using the Moore & Rosenthal subscales.

Using the Moore & Rosenthal subscales to assess the attitudes towards AIDS precautions gives this research project space to investigate whether the results are consistent with other findings or not. By knowing the causes of the negative attitudes towards AIDS precautions, the AIDS prevention policies could be more effective to convert the negative attitudes to more positive attitudes.

As indicated earlier in Chapter three, the items were re-scored so that higher numbers reflected negative attitudes toward AIDS precautions and lower numbers reflected positive attitudes.

The most important factor that must be compared is the gender influence. When investigating the averages of age of first time to have vaginal sex with respect to the gender, males reported a significantly earlier age of first intercourse (15.8 years) than females did (16.7 years) (T-test = 4.08; P<0.01) (see Appendix (F), Table 1 and 2).

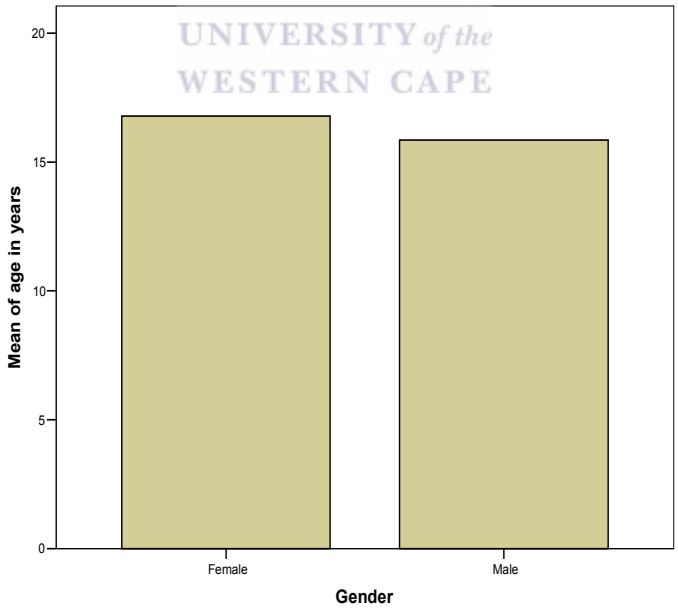

Figure 4.7: Mean age of first vaginal sex by gender.
Note: Figure 4.7 is referenced to Appendix (F), Table 1.

When the averages of the subscale variables (see Table 4.1) are investigated with respect to the gender, a T-test was used to compare the means. Males appeared more likely to express

Antiprecaution attitudes (T-test= -3.081; p<0.01) (see Appendix (G), Table 1 and 2), and scored more highly on the subscale *Fatalism* (T-test = -2.365; p<0.05) (see Appendix (G), Table 1 and 2). There is no significant difference between males and females with respect to *Denial of Risk* or *Abrogation of Responsibility* (see Table 4.2).

Table 4.2: Attitudes to AIDS precautions with respect to gender

Attitudes type	Gender	N	Mean	Std. Deviation	T-test value	P. Value
Antiprecaution	Female	191	3.8	2.9	-3.086	0.002*
	Male	143	4.8	3.0		
Denial of Risk	Female	191	7.0	0.20	-1.698	0.09 NS
	Male	143	7.6	0.25		
Abrogation of Responsibility	Female	191	5.1	3.3	-1.018	0.31 NS
	Male	143	5.5	0.3.1		
Fatalism	Female	191	4.8	2.3	-2.434	0.02*
	Male	143	5.5	2.8		

NS=not significant at 0.05 level of significant
*= significant at 0.05 level of significant

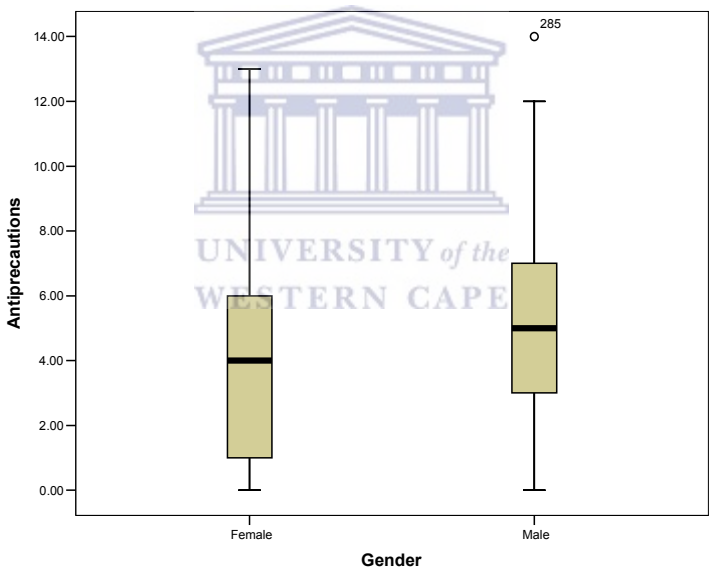

Figure 4.8: Variation in the *Antiprecaution* subscale for males and females.

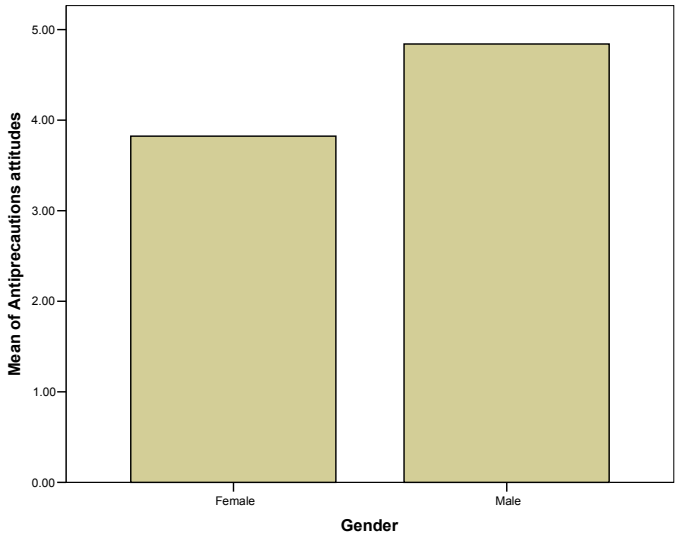

Figure 4.9: Mean of *Antiprecaution* attitudes with respect to gender.

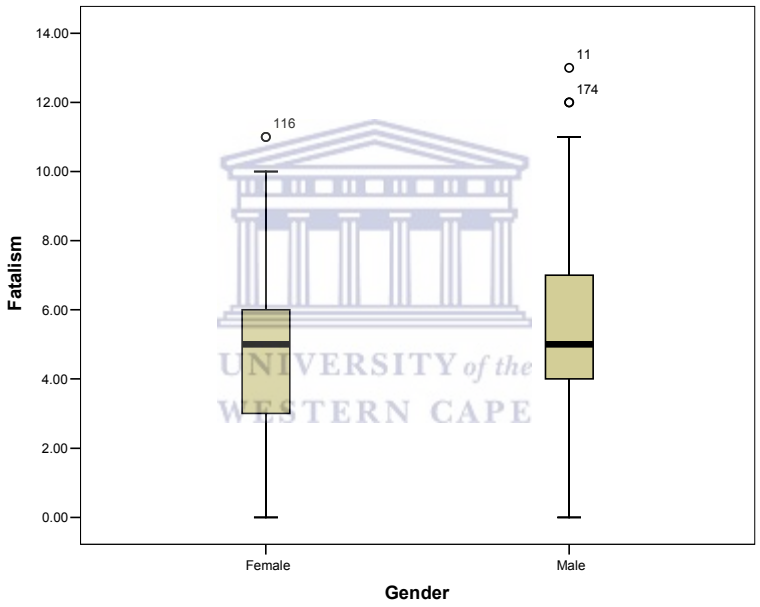

Figure 4.10: Variation in the *Fatalism* subscale for males and females.

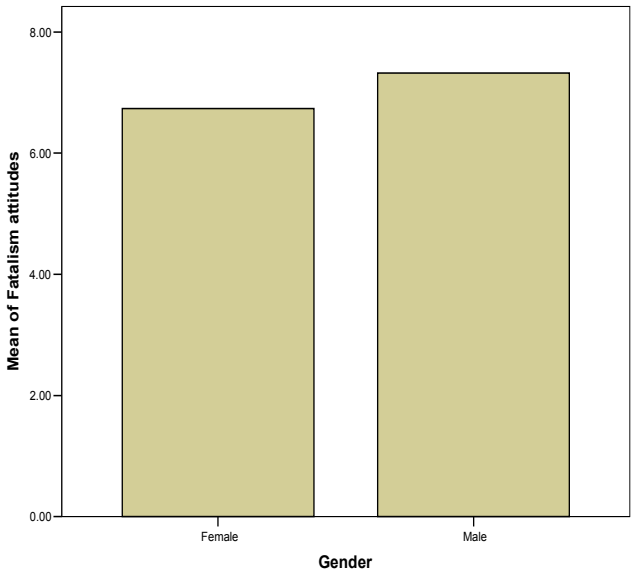

Figure 4.11: Mean of *Fatalism* attitudes with respect to gender.

Note: Figure 4.8 to Figure 4.11 is referenced to Appendix (G), Table 1.

When the averages of the subscale variables that are presented in Table 4.1 are investigated with respect to the home language and religion, a one-way ANOVA was used to compare the means. There was no significant difference in the attitudes towards AIDS precautions with regards to the home languages. Religion's group sizes are too widely spread to compare the means by ANOVA (see Appendix (H), Tables 1 and 2).

To investigate attitudes towards AIDS precautions of students who personally knew someone with HIV/AIDS compared to students who did not know anyone with HIV/AIDS, T-tests were used to compare means. No differences between these two groups were found (see Appendix (I), Tables 1 and 2).

Factor analysis results are presented in the next section to identify the smallest number of factors that best explain the variance among the 24-items.

4.5. The factor analysis of the 24-item scale

This section is divided into three subsections; the first subsection investigates the appropriateness of the 24-items for factor analysis, in the second subsection three factor models using Pearson, Spearman and Polychoric correlation matrices will be performed, the third subsection is a comparison between the Pearson, Spearman and Polychoric models.

4.5.1. Appropriateness of the data for factor analysis

This subsection describes the 24-items and their codes and then investigates the appropriateness of the data for factor analysis. For analysis reasons the researcher gives each item (question) a code. Table 4.3 displays the items with their codes.

Table 4.3: The 24-items and their codes

Item code	Description
1	AIDS precautions are a nuisance - I could not be bothered taking any precautions.
2	I have tried taking precautions against AIDS but I find it difficult.
3	Putting on a condom need not interfere with sexual pleasure.
4	Condoms are a nuisance.
5	It is a good idea to take precautions against AIDS but it can have a bad effect on people's sex lives.
6	AIDS is a worry but I don't like the thought of using a condom.
7	I might get around to taking AIDS precautions one day but I have not yet.
8	None of my friends are the kind of people who'd be AIDS carriers, it is just not an issue with me.
9	The possibility of me catching AIDS is something I have never really thought about.
10	I don't intend to have sexual intercourse until I'm in a long lasting relationship, so AIDS is not a threat.
11	Using condoms is not the way to control AIDS, self-control is the answer.
12	If people followed traditional moral codes (e.g. one partner of the opposite sex), they would have nothing to fear from AIDS.
13	If I talk about AIDS with a sex partner they might be insulted.
14	It is up to a woman to speak up if she wants a man to use a condom.
15	I would like to discuss AIDS precautions with a partner but I wouldn't be able to bring up the subject.
16	Taking measures against AIDS could seem like an insult to a sex partner.
17	I have thought about AIDS and believe it is something I will need to discuss with my partner.
18	I know I should think about taking measures against AIDS, but I have not worked out what.
19	It is hard to know what to think about AIDS - even the experts do not agree.
20	Apart from a few innocent people, those who get AIDS are only getting what they deserve.
21	Part of me understands the AIDS risk, but another part of me cannot accept that possibility.
22	As a result of the AIDS threat, I have resolved to be more responsible in my approach to sex.
23	Life is full of risks and AIDS is just an example: if you don't take risks you don't have fun.
24	There is a chance I could get AIDS I suppose, but that's life - there's not much I can do about it.

Is the 24-item scale appropriate for the use of factor analysis? The correlation matrix can be used as a visual "picture" when high correlations among the variables indicate that the variables can be grouped into sets of variables such that each set of variables measures the same underlying constructs or dimensions. However, visual examination of the correlation matrix for a large number of variables is almost impossible. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy can be used for a large number of variables because the correlation matrix can be used only for a small number of variables. It is suggested that the overall KMO measure should be greater than 0.80, although there are no statistical test for the KMO measure. Kaiser and Rice (1974) suggested the following guidelines (Sharma, 1996:116) (see Table 4.4).

Table 4.4: Kaiser and Rice (1974) guidelines for sampling adequacy

KMO Measure	Recommendation
≥ 0.90	Marvellous
0.80+	Meritorious
0.70+	Middling
0.60+	Mediocre
0.50+	Miserable
Below 0.50	Unacceptable

Source: (Sharma, 1996:116)

Overall values of KMO were equal to 0.78, 0.84 and 0.80 for the Pearson, Spearman and Polychoric correlation matrices, respectively. The KMO measure suggested that all of the correlation matrices were appropriate for factor analysis but the numerical values of the KMO measure suggested that the Spearman correlation matrix was more appropriate for factoring than Pearson and polychoric correlation matrices. It is difficult to make a statement saying that Spearman is the most appropriate correlation matrix for this data set when there is no significance test for the KMO measurement.

4.5.2. Factor models using Pearson, Spearman and Polychoric correlation matrix

In this section the researcher will conduct the principal component factoring using three different correlation matrices.

4.5.2.1. Factor model using the Pearson correlation matrix

After using the Pearson correlation matrix to conduct the factor model, eight factors were retained according to the eigenvalue-greater-than-one rule. The eight factors represented 54% of the variance among the 24-items (see Table 4.5).

Table 4.5: The eigenvalues and their cumulative proportion of total sample variance

	F1	F2	F3	F4	F5	F6	F7	F8
Eigenvalues	4.27	1.54	1.50	1.32	1.21	1.17	1.09	1.04
Cumulative proportion of total (standardized) sample variance	0.17	0.24	0.30	0.36	0.41	0.45	0.50	0.54

The most important questions are: what do the eight factors represent? What are the underlying dimensions that account for the correlation among the variables? Since the factor solution was not unique, a Varimax rotation was used to find a simple structure. It can clearly be seen from the rotated factor solution that some of the items loaded highly on one specific factor and they had low loadings on the other factors (see Appendix (J), Table 1).

Table 4.6 displays the factors and their loadings using the Pearson correlation matrix.

Table 4.6: Factor loadings (Pearson)

Item code	Content	Factor loadings
Factor 1		
3	Putting on a condom need not interfere with sexual pleasure.	-0.76
16	Taking measures against AIDS could seem like an insult to a sex partner.	0.71
17	I have thought about AIDS and believe it is something I will need to discuss with my partner.	-0.74
22	As a result of the AIDS threat, I have resolved to be more responsible in my approach to sex.	-0.47
Factor 2		
4	Condoms are a nuisance.	0.73
9	The possibility of me catching AIDS is something I have never really thought about.	0.58
10	I don't intend to have sexual intercourse until I'm in a long lasting relationship, so AIDS is not a threat.	0.59
21	Part of me understands the AIDS risk, but another part of me cannot accept that possibility.	0.43
Factor 3		
8	None of my friends are the kind of people who'd be AIDS carriers, it is just not an issue with me.	0.72
11	Using condoms is not the way to control AIDS, self-control is the answer.	0.64
12	If people followed traditional moral codes (e.g. one partner of the opposite sex), they would have nothing to fear from AIDS.	0.40
24	There is a chance I could get AIDS I suppose, but that's life - there's not much I can do about it.	0.60
Factor 4		
5	It is a good idea to take precautions against AIDS but it can have a bad effect on people's sex lives.	-0.42
7	I might get around to taking AIDS precautions one day but I have not yet.	0.62
13	If I talk about AIDS with a sex partner they might be insulted.	0.59
Factor 5		
2	I have tried taking precautions against AIDS but I find it difficult.	0.57
6	AIDS is a worry but I don't like the thought of using a condom.	0.70
15	I would like to discuss AIDS precautions with a partner but I wouldn't be able to bring up the subject.	0.56
Factor 6		
1	AIDS precautions are a nuisance - I could not be bothered taking any precautions.	0.62
23	Life is full of risks and AIDS is just an example: if you don't take risks you don't have fun.	-0.51
Factor 7		
14	It is up to a woman to speak up if she wants a man to use a condom.	0.66
20	Apart from a few innocent people, those who get AIDS are only getting what they deserve.	-0.59
Factor 8		
18	I know I should think about taking measures against AIDS, but I have not worked out what.	0.67
19	It is hard to know what to think about AIDS - even the experts do not agree.	0.75

The correlation between any item and factor was equal to its structure loadings (Sharma, 1996). Each item showed a high correlation with one factor but low correlation with all of the other factors.

It was very important to know, how well the eight factors can account for the variance among the 24-items. The residual correlation matrix can be used for this purpose. It can clearly be seen from the residuals matrix that, the residuals were small and the root mean square off-diagonal residual (RMSR) was equal to 0.071, implying a good factor solution.

4.5.2.2. Factor model using the Spearman correlation matrix

When the Spearman correlation matrix was used to obtain the factor model, eight factors were retained according to the eigenvalue-greater-than-one rule. The eight factors represented 57% of the variance among the 24-items (see Table 4.7).

Table 4.7: The eigenvalues and their cumulative proportion of total sample variance

	F1	F2	F3	F4	F5	F6	F7	F8
Eigenvalues	5.07	1.51	1.42	1.30	1.18	1.12	1.09	1.01
Cumulative proportion of total (standardized) sample variance	0.21	0.27	0.33	0.38	0.43	0.48	0.52	0.57

When the factor solution is rotated, some of the items loaded highly on one specific factor and they had low loadings on the other factors (see Appendix (K), Table 1).

Table 4.8 displays the factors and their loadings after rotating the factor solution using the Varimax rotation method.

Table 4.8: Factor loadings (Spearman)

Item code	Content	Factor loadings
Factor 1		
3	Putting on a condom need not interfere with sexual pleasure.	- 0.76
16	Taking measures against AIDS could seem like an insult to a sex partner.	0.68
17	I have thought about AIDS and believe it is something I will need to discuss with my partner.	- 0.72
22	As a result of the AIDS threat, I have resolved to be more responsible in my approach to sex.	- 0.48
Factor 2		
7	I might get around to taking AIDS precautions one day but I have not yet.	-0.55
13	If I talk about AIDS with a sex partner they might be insulted.	-0.55
14	It is up to a woman to speak up if she wants a man to use a condom.	0.55
20	Apart from a few innocent people, those who get AIDS are only getting what they deserve.	-0.44
21	Part of me understands the AIDS risk, but another part of me cannot accept that possibility.	0.67
Factor 3		
4	Condoms are a nuisance.	0.65
9	The possibility of me catching AIDS is something I have never really thought about.	0.49
10	I don't intend to have sexual intercourse until I'm in a long lasting relationship, so AIDS is not a threat.	0.69
Factor 4		
2	I have tried taking precautions against AIDS but I find it difficult.	0.55
5	It is a good idea to take precautions against AIDS but it can have a bad effect on people's sex lives.	0.43
6	AIDS is a worry but I don't like the thought of using a condom.	0.71
Factor 5		
8	None of my friends are the kind of people who'd be AIDS carriers, it is just not an issue with me.	0.74
11	Using condoms is not the way to control AIDS, self-control is the answer.	0.65
12	If people followed traditional moral codes (e.g. one partner of the opposite sex), they would have nothing to fear from AIDS.	0.35
24	There is a chance I could get AIDS I suppose, but that's life - there's not much I can do about it.	0.58
Factor 6		
1	AIDS precautions are a nuisance - I could not be bothered taking any precautions.	-0.42
23	Life is full of risks and AIDS is just an example: if you don't take risks you don't have fun.	0.78
Factor 7		
18	I know I should think about taking measures against AIDS, but I have not worked out what.	0.61
19	It is hard to know what to think about AIDS - even the experts do not agree.	0.78
Factor 8		
15	I would like to discuss AIDS precautions with a partner but I wouldn't be able to bring up the subject.	0.72

Each item showed a high correlation with one factor but a low correlation with all of the other factors. The residuals were small and the root mean square off-diagonal residuals (RMSR)

was equal to 0.067, which indicated that the final factor structure does a better job of explaining the variance among the items than the Pearson correlation model.

4.5.2.3. Factor model using the Polychoric correlation matrix

Eight factors were retained according to the eigenvalue-greater-than-one rule for determining the number of factors when the Polychoric correlation matrix was used. The eight factors represented 62% of the variance among the 24-item scale, the variance was summarized well by eight factors and the reduction in the data from 334 observations on 24-items to 334 observations on eight factors was reasonable (see Table 4.9). To see the Polychoric correlation matrix see Appendix (L), Table 1.

Table 4.9: The eigenvalues and their cumulative proportion of total sample variance

	F1	F2	F3	F4	F5	F6	F7	F8
Eigenvalues	5.79	1.67	1.55	1.39	1.23	1.19	1.09	1.05
Cumulative proportion of total (standardized) sample variance	0.24	0.31	0.37	0.43	0.48	0.53	0.58	0.62

In the rotated factor solution some of the items loaded highly on one factor and they had low loading on the other factors (see Appendix (M), Table 1).

Table 4.10 displays the factors and their loadings after rotation of the factor solution using Varimax rotation method.

Table 4.10: Factor loadings (Polychoric)

Item code	Content	Factor loading
Factor 1		
13	If I talk about AIDS with a sex partner they might be insulted.	0.77
15	I would like to discuss AIDS precautions with a partner but I wouldn't be able to bring up the subject.	0.72
16	Taking measures against AIDS could seem like an insult to a sex partner.	0.76
24	There is a chance I could get AIDS I suppose, but that's life - there's not much I can do about it.	0.53
Factor 2		
3	Putting on a condom need not interfere with sexual pleasure.	-0.66
6	AIDS is a worry but I don't like the thought of using a condom.	0.53
17	I have thought about AIDS and believe it is something I will need to discuss with my partner.	0.52
22	As a result of the AIDS threat, I have resolved to be more responsible in my approach to sex.	-0.54
23	Life is full of risks and AIDS is just an example: if you don't take risks you don't have fun.	0.57
Factor 3		
4	Condoms are a nuisance.	0.57
8	None of my friends are the kind of people who'd be AIDS carriers, it is just not an issue with me.	0.60
20	Apart from a few innocent people, those who get AIDS are only getting what they deserve.	0.78
Factor 4		
1	AIDS precautions are a nuisance - I could not be bothered taking any precautions.	0.58
7	I might get around to taking AIDS precautions one day but I have not yet.	0.75
18	I know I should think about taking measures against AIDS, but I have not worked out what.	0.59
Factor 5		
5	It is a good idea to take precautions against AIDS but it can have a bad effect on people's sex lives.	0.37
9	The possibility of me catching AIDS is something I have never really thought about.	0.68
21	Part of me understands the AIDS risk, but another part of me cannot accept that possibility.	0.73
Factor 6		
12	If people followed traditional moral codes (e.g. one partner of the opposite sex), they would have nothing to fear from AIDS.	0.54
19	It is hard to know what to think about AIDS - even the experts do not agree.	0.64
Factor 7		
10	I don't intend to have sexual intercourse until I am in a long lasting relationship.	0.64
11	Using condoms is not the way to control AIDS, self-control is the answer.	0.78
Factor 8		
2	I have tried taking precautions against AIDS but I find it difficult.	0.41
14	I have thought about AIDS and believe it is something I will need to discuss with my partner.	- 0.72

The residuals were all small and the root mean square off-diagonal residuals (RMSR) was 0.064, indicating that the final factor structure explains most of the variance among the items.

4.6. The main results

This section provides a summary of the main points that have emerged so far. When the sexual background of the respondents was investigated, it was found that males participate in the sexual intercourse at an earlier age than females do.

The researcher found that there was no acceptable internal consistency within each Moore and Rosenthal subscales (*Antiprecaution*, *Denial of Risk*, *Abrogation of Responsibility* and *Fatalism*). Especially the *Denial of Risk* and *Fatalism* subscales according to the widely accepted cut-off (0.70) for Cronbach's alpha.

After the normality of the Moore and Rosenthal subscales was assessed, the researcher found that there was no significant difference between males and females with respect to their attitudes towards AIDS precautions, except that, males were more likely than females to score highly on the *Antiprecaution* subscale and they expressed more fatalistic attitudes towards AIDS precautions. There was no significant difference in the attitudes towards AIDS precautions between students who knew someone with HIV/AIDS and those who did not know with HIV/AIDS.

There were no significant differences in the attitudes towards AIDS precautions with regards to the home languages and the religions using the Moore & Rosenthal subscales.

The KMO measure suggested that all of the correlation matrices were appropriate for factor analysis. As there is no significance test the numerical values of KMO will not be used to determine which is the most appropriate correlation matrix for factoring.

Eight factors were retained in the three models but the eight factors represented the variance among the 24-items differently. The Pearson factor model and the Spearman factor model respectively represented 54% and 57% of the variance among the 24-item scale, but the Polychoric factor model represented 62% which is the highest factor model to explain the variance among the 24-item scale.

The numerical values of RMSR showed that the Polychoric had the smallest RMSR value and Pearson had the largest, but it is difficult to state whether the Polychoric matrix does a better job compared to the Pearson matrix as no measurement exists to test this.

The factors loaded differently on the items for the three models but there were three items that grouped together in all of the three factor models. These items were 3, 17 and 22 which came from the *Antiprecaution, Abrogation of Responsibility* and *Fatalism* subscales.

The Pearson and Spearman factors models were almost the same, four factors were typically the same and there were four groups of items that contained the same items. The items in each group were mixtures of the Moore and Rosenthal subscales.

The next chapter presents the conclusions and recommendations. The results are also discussed in this chapter.

Chapter Five

Research results and recommendations

5.1. Introduction

In this chapter the major findings of this research project will be compared to the existing literature as reviewed in Chapter two. Finally some recommendations will be given.

5.2. Conclusion and Recommendations

After evaluating the sexual background and the sexual behaviour, it was found that males reported a significantly earlier age of first intercourse (first time to have vaginal sex) than females did (15.8 years for males and 16.7 years for females) which is consistent with findings of Ford & Norris (1996), Von Haeften *et al*. (2001) and Kenski (2001).

On average, males reported significantly more sexual partners in the last 12 months than females did. Eighty-seven percent of the students discussed condom usage with their sexual partners occasionally and 13% never discussed condoms with their partners.

Eighty-nine percent indicated that they have had vaginal sex. Sixty percent indicated that they always used a condom, 28% used condoms occasionally and 10.5% never used condoms. One still wonders as to why there is still a 10.5% who never used a condom? Sixty-seven percent students who knew that a person could contract HIV from oral sex never used a condom when they had oral sex.

This study found that there was no acceptable internal consistency within each Moore & Rosenthal subscale according to the widely accepted cut-off (0.70) for Cronbach's alpha. Moore & Rosenthal and Akande used 0.60 as a cut-off but even with this low cut-off the *Fatalism* subscale was lower than would generally be accepted. In this project the Cronbach's alpha for *Fatalism* had the lowest reliability coefficient.

Moore & Rosenthal (1991) and Akande (1997 & 2001) insisted to include the *Fatalism* subscale because of its conceptual importance. What would Moore & Rosenthal and Akande do if they found that all of the subscales were lower than the 0.60 cut-off? The *Fatalism* and *Denial of Risk* subscales showed lower reliability coefficients in all of the studies. The

Fatalism and *Denial of Risk* subscales should be investigated in order to find more consistent subscales.

There was no difference in the attitudes towards AIDS precautions between the students who personally knew someone with HIV/AIDS and those who did not. There were no significant differences in the attitudes towards AIDS precautions with regards to the home language or religion.

In this research project, males were more likely when compare to females to score high on the *Antiprecaution* subscale and they expressed more fatalistic attitudes toward AIDS precautions. There were no differences in the *Denial of Risk* and *Abrogation of Responsibility* with respect to gender.

Moore & Rosenthal in 1991 with their Australian sample and Akande in 1997 & 2001 with the South African samples found that males were more likely to score higher than females on the *Antiprecaution* and *Abrogation of Responsibility* subscales. No significant differences were found on the *Denial of Risk* or *Fatalism*. Smith *et al*. in 1998 found that females were less likely to score high in all of the subscales when using Australian and South African undergraduate students.

There were slight differences between the results that were reviewed in the literature but males were always more likely to score high on the *Antiprecaution* subscale than females. In addition, the *Antiprecaution* subscale had the highest reliability coefficient in all of the previous including this research project. The *Antiprecaution* subscale was therefore found to be well designed to measure the attitudes towards AIDS precautions.

Different results where eminent when exploratory factor analysis was conducted using different correlation matrices. According to the eigenvalue-greater-that-one criterion eight factors should be retained in the three models. The eight factors represented the variance among the 24-items differently. The Pearson factor model and Spearman factor model represented 54% and 57%, respectively. The Polychoric factor model represented 62% of the variance. The Polychoric factor model was thus the best factor model to explain the variance among the 24-items but all of the correlation matrices were suitable for factor analysis according to KMO measure of adequacy.

The factors loaded differently on the items regarding to the three models but each item showed a high correlation with one factor and a low correlation with all of the other factors.

Three items were always grouped in one group in all of the three factor models explored but these three items individually belonged to the *Antiprecaution*, *Abrogation of Responsibility a*nd *Fatalism* subscales as defined by Moore & Rosenthal.

The Polychoic model was totally different from the Pearson and the Spearman models with respect to the distribution of the items in each factor. The factors in the Polychoric model contained different items from those in the Pearson and Spearman models. The three factor models were different with respect to the explained variance and the distribution of the 24-items in the factors. The Polychoric model explained 62% of the variance among the 24-item scale whereas the Spearman and Pearson models explained 57% and 54%, respectively.

The square root of the average squared values of the off diagonal elements were 0.064, 0.067 and 0.071 for the Polychoric, Spearman and Pearson models, respectively. No measure exists to test which of the models is statistically and better therefore it was difficult to state that the Polychoric model was superior to the Pearson and Spearman models.

The Pearson's RMSR value is larger than that of the Polychoric and Spearman models. The RMSR value for the Polychoric and Spearman models are almost the same implying that both of these models are good in explaining the variance among the 24-item scale.

The results above confirmed the overuse of Pearson correlation matrix. The Pearson factor analysis model obtained the lowest explained variance and biggest RMSR value. In line with the suggestion of Panter *et al*. (1997) familiar factor analyses should be conducted on the Polychoric correlation matrix when the items are based on ordered categories.

The factor analysis results that were obtained by using the correlation matrices should be verified by using re-sampling or bootstrapping to validate the results but the practical time of the research did not allow for the researcher to re-sample or bootstrap. It is recommended that re-sampling or bootstrapping be investigated in the future studies on the 24-item scale to verified and validate the factor analysis results.

It should be mentioned that the Polychoric correlation matrix is based on the assumption that the response categories are actually proxies for unobserved, normally distributed variables (Panter *et al*., 1997). In addition, there are problems affecting the correlation matrices and there are problems related to the correlation among the items. Under the normality assumption and with the problems that are associated with the correlation matrices it is recommended to conduct a full information factor analysis, which is a factor analytic technique based on item response theory (IRT). This however is beyond the scope of this project.

Applications of item response theory (IRT) have increased considerably in educational, psychological, and health outcomes measurement rather than the classical test theory (CTT) because it provides more in-depth analysis of items included in the questionnaires. IRT facilitates the development of efficient questionnaires by reducing the number of items to be included in a scale. It assumes unidimensionality of the items but does not preclude that the set of items may have a number of minor dimensions (subscales). If multidimensionality exists, multidimensionality IRT models should be used (Bryce, B. R. & Louise, C. M., 2004:247).

The 24-item scale is based on CTT principals and does not take advantage of IRT methodologies. It is recommended that (IRT) be investigated in future studies on the 24-item scale to validate or develop new subscales.

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APPENDICES

Appendix (A)

Table 1: The 24-item scale to AIDS precautions and their subscales

Subscale	Items
Antiprecaution	AIDS precautions are a nuisance – I couldn't be bothered taking any precautions. I have tried taking precautions against AIDS but I find it difficult. Putting on a condom need not interfere with sexual pleasure. Condoms are a nuisance. It's a good idea to take precautions against AIDS but it can have a bad effect on people's sex lives. AIDS is a worry but I don't like the thought of using a condom.
Denial of Risk	I might get around to taking AIDS precautions one day but I haven't yet. None of my friends are the kind of people who would be AIDS carriers, it's just not an issue with me. The possibility of me catching AIDS is something I've never really thought about. I do not intend to have sexual intercourse until I am in a long lasting relationship, so AIDS is not a threat. Using condoms is not the way to control AIDS, self-control is the answer. If people followed traditional moral codes (e.g. one partner of the opposite sex), they would have nothing to fear from AIDS.
Abrogation of Responsibility	If I talk about AIDS with a sex partner they might be insulted. It is up to a woman to speak up if she wants a man to use a condom. I'd like to discuss AIDS precautions with a partner but I wouldn't be able to bring up the subject. Taking measures against AIDS could seem like an insult to a sex partner. I've thought about AIDS and believe it's something I will need to discuss with my partner. I know I should think about taking measures against AIDS, but as yet I haven't worked out what I will do about it.
Fatalism	It's hard to know what to think about AIDS – even the experts don't agree. Apart from a few innocent people, those who get AIDS are only getting what they deserve. Part of me understands the AIDS risk, but another part of me can't accept that possibility. As a result of the AIDS threat, I have resolved to be more responsible in my approach to sex. Life is full of risks and AIDS is just an example: if you don't take risks you don't have fun. There is a chance I could get AIDS I suppose, but that's life – there's not much I can do about it.

Appendix (B)
The original questionnaire- Zaweca HIV/AIDS project

Questionnaire number:	

University of the Western Cape

First year survey

Dear Student,

Thank you for participating in this research. ***Your answers to the questions in this questionnaire will be confidential and are completely anonymous. No-one will know who answered this questionnaire. You are not required to give your name or student number.***

Your participation in this research is entirely voluntary. If you do not feel comfortable answering any of the questions or do not want to participate in this research, then you are free not to answer the specific questions or to leave the whole questionnaire blank.

Please answer the following questions as honestly as possible.. Please enter your answers on this questionnaire where a space is provided or select only one option as indicated below.

1. Gender:

Female		1
Male		2

2. Age in years?

3. Marital status.

Single		1
Married		2

4. Do you personally know anyone with HIV/AIDS?

Yes		1
No		2

5. *My home language is:

Xhosa		1
English		2
Afrikaans 3		
Zulu		4
Other		5

If OTHER:PLEASE fill in your home language in the space provided _____

6. *In which province did you matriculate?

Western Cape		1
Eastern Cape		2
Northern Cape		3
Gauteng		4
Other		5

If OTHER:PLEASE fill in your home language in the space provided _____

7. Do you feel that you know enough about HIV/AIDS?

Yes		1
No		2

8. Have you ever taken a voluntary HIV test?

Yes		1
No		2

9. Do you intend to go for an HIV test?

No		1
Yes		2

10. My religion is:

Christian		1
Moslem		2
Traditional		3
Other		4

If other: please fill in your religion here ……

11. How important is your religion in influencing your sexual behaviour:

Very important		1
Somewhat important		2
Slightly important		3
Not sure		4
Unimportant		5

12. Have you ever had vaginal sex?

No, never		1
Yes, occasionally		2
Yes, often		3

13. How old were you when you first had vaginal sex?

years

(never had vaginal sex = leave blank)

14. Did you use a condom the last time you had vaginal sex?

Never had vaginal sex		1
No		2
Yes		3

15. How often do you use condoms when you have vaginal sex?

Never had vaginal sex		1
Never use condoms		2
Occasionally use condoms		3
Always use a condom		4

16. Have you ever had oral sex?

No		1
Yes		2

17. How old were you when you first had oral sex?

[ ][ ] years

(never had oral sex = leave blank)

18. Do you think you can contract HIV from oral sex?

No		1
Yes		2

19. How often do you use protection (condom/barrier) when you have oral sex?

Never had oral sex		1
Never		2
Occasionally		3
Always		4

20. Have you ever had anal sex?

No		1
Yes		2

21. How old were you when you first had anal sex?

[ ][ ] years

(never had anal sex = leave blank)

22. Do you think you can contract HIV from anal sex?

No		1
Yes		2

23. How often do you use a condom when you have anal sex?

Never had anal sex		1
Never		2
Yes, sometimes		3
Yes, every time		4

24. Think back to the first time you had sex. Was it with your consent/permission?

Never had sex		1
Not sure		2
No		3
Yes		4

25. How many sexual partners have you had in the last 12 months?

None, never had sex		1
None in the last year		2
1		3
2		4
3 or more		5

26. Have you ever discussed condoms with a sexual partner?

Never had sex		1
Never		2
Occasionally		3

27. Have you ever forced anyone to have sex?

No		1
Yes		2

28. Have you ever been forced to have sex?

No		1
Yes		2

29. Have you ever talked about going for an HIV-test with your partner?

No		1
Yes		2
Never had sex		3

30. I know where to get condoms on campus

No		1
Yes		2

31. I know where to go for an HIV test(VCT) on campus

No		1
Yes		2

32. Have you ever had sex with a person of the same sex/gender as you?

No		1
Yes		2

33. Do you know your HIV status?

No		1
Yes		2

To what extent do you agree or disagree with each of the following statements?

	Statement	Strongly agree =1	Agree =2	Disagree =3	Strongly disagree =4
34.	I would feel uncomfortable hugging someone who has HIV/AIDS	□	□	□	□
35.	People who contract HIV/AIDS get pretty much what they deserve	□	□	□	□
36.	If my roommate or housemate had HIV/AIDS, I would ask that person to move out	□	□	□	□
37.	Students who have HIV/AIDS should not be allowed to attend this university	□	□	□	□
38.	All students at this university should be forced to go for an HIV test	□	□	□	□
39.	I am not personally at risk of contracting HIV/AIDS	□	□	□	□
40.	I'm sick and tired of hearing about AIDS	□	□	□	□
41.	I would not feel comfortable using the same toilet as someone with HIV/AIDS	□	□	□	□
42	I know exactly how to use a condom.	□	□	□	□
43	I will be able to discuss condoms with my sexual partner.	□	□	□	□

Please answer each of the following statements

	Statement	I am sure it's true =1	I think it's true =2	I think it's false =3	I'm sure it's false =4
44.	Many people who are infected with HIV can look and feel healthy.	□	□	□	□
45.	AIDS is not really caused by HIV.	□	□	□	□
46.	If you really love your partner, it is not necessary to use a condom.	□	□	□	□
47.	Any person can become infected with HIV by having sex without a condom with someone who is infected by HIV.	□	□	□	□
48.	Mothers can pass HIV to their babies through breast milk.	□	□	□	□
49.	People who are infected with HIV always show clear signs of being sick.	□	□	□	□
50.	Mosquitoes can pass on HIV just like they can pass on malaria.	□	□	□	□
51	HIV is a disease that mainly affects homosexuals.	□	□	□	□
52.	A person can get HIV by smoking the same cigarette that someone with HIV has smoked.	□	□	□	□
53.	A person can become infected by HIV when donating blood.	□	□	□	□
54.	People who are careful to have sex only with healthy-looking partners won't become infected with HIV.	□	□	□	□
55.	People who are infected with HIV can give it to other people by shaking hands.	□	□	□	□

To what extent do you agree or disagree with each of the following statements?

	Statement	Strongly agree =1	Agree =2	Disagree =3	Strongly disagree =4
56.	It's hard to know what to think about AIDS – even the experts don't agree.	□	□	□	□
57.	AIDS precautions are a nuisance – I couldn't be bothered taking any precautions.	□	□	□	□
58.	If I talk about AIDS with a sex partner they might feel offended.	□	□	□	□
59.	Apart from a few innocent people, those who get AIDS are only getting what they deserve.	□	□	□	□
60.	I have tried taking precautions against AIDS but I find it difficult.	□	□	□	□
61	I might get around to taking AIDS precautions one day but I haven't yet.	□	□	□	□
62.	Putting on a condom need not interfere with sexual pleasure.	□	□	□	□
63.	Part of me understands the AIDS risk, but another part of me can't accept that possibility.	□	□	□	□
64.	Condoms are a nuisance.	□	□	□	□
65.	None of my friends are the kind of people who would be AIDS carriers; it's just not an issue with me.	□	□	□	□
66.	The possibility of me catching AIDS is something I've never really thought about.	□	□	□	□
67.	It's a good idea to take precautions against AIDS but it can have a bad effect on people's sex lives.	□	□	□	□
68.	As a result of the AIDS threat, I have resolved to be more responsible in my approach to sex.	□	□	□	□
69.	Life is full of risks and AIDS is just an example: if you don't take risks you don't have fun.	□	□	□	□
70.	It is up to a woman to speak up if she wants a man to use a condom.	□	□	□	□

	Statement	Strongly agree =1	Agree =2	Disagree =3	Strongly disagree =4
71.	I'd like to discuss AIDS precautions with a partner but I wouldn't be able to bring up the subject.	□	□	□	□
72.	Taking measures against AIDS could seem like an insult to a sex partner.	□	□	□	□
73.	I do not intend to have sexual intercourse until I am in a long lasting relationship, so AIDS is not a threat.	□	□	□	□
74.	Using condoms is not the way to control AIDS, self-control is the answer.	□	□	□	□
75.	I've thought about AIDS and believe it's something I will need to discuss with my partner.	□	□	□	□
76.	AIDS is a worry but I don't like the thought of using a condom.	□	□	□	□
77.	There is a chance I could get AIDS I suppose, but that's life – there's not much I can do about it.	□	□	□	□
78.	If people followed traditional moral codes (e.g. one partner of the opposite sex), they would have nothing to fear from AIDS.	□	□	□	□
79.	I know I should think about taking measures against AIDS, but as yet I haven't worked out what I will do about it.	□	□	□	□
80	You can take precautions or not against HIV, whatever happens is meant to happen.	□	□	□	□

81	I have a problem with men joking about having sex with women.	□	□	□	□
82.	It would bother me if my friend hit his girlfriend.	□	□	□	□
83.	It is the man who decides what type of sex to have.	□	□	□	□
84.	There is pressure on men and women to be sexually active.	□	□	□	□
85.	If she wants, a woman can have more than one sexual partner.	□	□	□	□
86.	Men need sex more than women do.	□	□	□	□
87.	When a man is sexually aroused, he may not even realize that a woman is resisting his advances.	□	□	□	□
88.	Women who carry condoms on them are 'easy'.	□	□	□	□
89.	When it comes to sexual activity, "no means no".	□	□	□	□
90.	Being drunk is no excuse for forcing a woman to have sex.	□	□	□	□
91.	If a woman flirts (fools around) with a man it means she wants to have sex with him.	□	□	□	□

	Statement	**Strongly agree =1**	**Agree =2**	**Disagree =3**	**Strongly disagree =4**
92.	If a woman has been drinking it is her fault if she gets raped.	□	□	□	□
93.	If I heard a friend verbally abusing a woman I would most likely stay out of it.	□	□	□	□
94.	If I saw a man hitting a woman I would do something to help her.	□	□	□	□
95.	If a woman goes to a man's room it doesn't mean she wants to have sex.	□	□	□	□
96.	It is a woman's responsibility to avoid getting pregnant.	□	□	□	□
97.	A man needs other women, even if he has a steady girlfriend.	□	□	□	□
98.	It is okay for a man to hit his girlfriend if she won't have sex with him.	□	□	□	□
99.	I would have sex with someone without their permission if no one would find out.	□	□	□	□
100	I will stop sexual intercourse when asked to even if I am already sexually aroused.	□	□	□	□
101	A woman needs other men, even if she has a steady boyfriend.	□	□	□	□
102	In my opinion a woman can suggest using condoms just like a man can.	□	□	□	□

	Less than 5%	**Between 5% & 10%**	**Between 10% & 20%**	**Between 20% and 50%**	**Between 50% and 60%**	**More than 60%**
103. What percentage of first year students at UWC do you think have had sex?	□	□	□	□	□	□
104. What percentage of students at UWC do you think are HIV+?	□	□	□	□	□	□

Thank you for your cooperation and time. *ZAWECA HIV/AIDS PROJECT*

Appendix (C)

T-test for the number of partners with regards to gender

Table 1

Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Number of partners in last 12 months	Female	188	1.3032	.72288	.05272
	Male	142	1.6972	1.03820	.08712

Table 2

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Number of partners in last 12 months	Equal variances assumed	51.135	.000	-4.061	328	.000	-.39399	.09701	-.58483	-.20316
	Equal variances not assumed			-3.869	239.006	.000	-.39399	.10183	-.59460	-.19338

Appendix (D)

Reliability analysis for the Moore & Rosenthal subscales

Table 1:

Reliability Statistics for the Antiprecautions subscale

Cronbach's Alpha	N of Items
.608	6

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
AIDS precautions are a nuisance - I could not be bothered taking any precautions	3.9222	7.772	.243	.597
I have tried taking precautions against AIDS but I find it difficult	3.5210	6.965	.351	.560
Condoms are a nuisance	3.7066	6.556	.424	.529
AIDS is a worry but I don"t like the thought of using a condom	3.5659	6.409	.462	.513
V65RRR	3.4072	6.885	.245	.608
It is a good idea to take precautions against AIDS but it can have a bad effect on peoples sex lives	3.1647	6.354	.345	.564

Table: 2

Reliability Statistics for the Denial of Risk

Cronbach's Alpha	N of Items
.411	6

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
I might get around to taking AIDS precautions one day but I have not yet	6.3862	6.760	.208	.360
None of my friends are the kind of people who"d be AIDS carriers, it is just not an issue with me	6.4731	7.037	.228	.351
The possibility of me catching AIDS is something I have never really thought about	6.0898	6.899	.207	.361
I don"t intend to have sexual intercourse until I am in a long lasting relationship, so AIDS is not a threat	5.9521	6.598	.242	.338
Using condoms is not the way to control AIDS, self-control is the answer	5.3323	7.039	.121	.417
If people followed traditional moral codes (one partner of the opposite sex), not fear AIDS	6.0090	6.736	.182	.377

Table: 3

Reliability Statistics for Abrogation of Responsibility

Cronbach's Alpha	N of Items
.576	6

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
If I talk about AIDS with a sex partner they might be insulted	4.4401	7.538	.435	.480
It is up to a woman to speak up if she wants a man to use a condom	4.1138	7.771	.146	.640
I would like to discuss AIDS precautions with a partner but I wouldn"t be able to bring up the subject	4.4701	7.337	.429	.478
Taking measures against AIDS could seem like an insult to a sex partner	4.5329	7.229	.520	.443
I know I should think about taking measures against AIDS, but I have not worked out what	4.1287	8.533	.260	.553
V78RRR	4.6168	8.832	.200	.574

Table: 4

Reliability Statistics for Fatalism

Cronbach's Alpha	N of Items
.369	6

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
V71RRR	4.5719	5.345	.193	.315
It is hard to know what to think about AIDS - even the experts do not agree	3.5090	5.608	.051	.411
Apart from a few innocent people, those who get AIDS are only getting what they deserve	4.5299	5.391	.139	.348
Part of me understands the AIDS risk, but another part of me cannot accept that possibility	3.8623	4.744	.223	.288
Life is full of risks and AIDS is just an example: if you dont take risks you dont have fun	4.6886	5.302	.197	.311
There is a chance I could get AIDS I suppose, but that"s life - there"s not much I can do about it	4.6168	5.258	.248	.283

Appendix (E)

Shapiro & Wilk statistics

Table: 1

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Antiprecautions	.085	334	.000	.955	334	.000
Denial of risk	.085	334	.000	.985	334	.002
Abrogation of responsibility	.087	334	.000	.971	334	.000
Fatalism attitude	.108	334	.000	.980	334	.000

a. Lilliefors Significance Correction

Appendix (F)

T-test for the age of first vaginal intercourse with regards to gender

Table 1

Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
How old were you when you first had vaginal sex	Female	168	16.79	1.809	.140
	Male	118	15.86	2.010	.185

Table 2

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
How old were you when you first had vaginal sex	Equal variances assumed	2.812	.095	4.087	284	.000	.930	.227	.482	1.378
	Equal variances not assumed			4.012	234.754	.000	.930	.232	.473	1.386

Appendix (G)

T-tests for the attitudes towards AIDS precautions with regards to gender

Table 1

Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Antiprecautions	Female	191	3.8220	2.96466	.21452
	Male	143	4.8392	3.00153	.25100
Denial of risk	Female	191	7.0105	2.86354	.20720
	Male	143	7.5664	3.08691	.25814
Abrogation of responsibility	Female	191	5.1047	3.30224	.23894
	Male	143	5.4685	3.13725	.26235
Fatalism attitude	Female	191	4.8586	2.34317	.16955
	Male	143	5.5524	2.86228	.23936

Table 2

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Antiprecautions	Equal variances assumed	.078	.780	-3.086	332	.002	-1.01717	.32959	-1.66552	-.36882
	Equal variances not assumed			-3.081	303.988	.002	-1.01717	.33018	-1.66690	-.36745
Denial of risk	Equal variances assumed	1.317	.252	-1.698	332	.090	-.55596	.32745	-1.20011	.08818
	Equal variances not assumed			-1.680	293.014	.094	-.55596	.33101	-1.20742	.09550
Abrogation of responsibility	Equal variances assumed	.783	.377	-1.018	332	.310	-.36382	.35748	-1.06703	.33940
	Equal variances not assumed			-1.025	313.877	.306	-.36382	.35485	-1.06201	.33437
Fatalism attitude	Equal variances assumed	6.165	.014	-2.434	332	.015	-.69381	.28509	-1.25461	-.13301
	Equal variances not assumed			-2.365	269.532	.019	-.69381	.29332	-1.27130	-.11632

Appendix (H)

Analysis of variance for the attitudes towards AIDS precautions with respect to the home language and the religion

Table: 1

ANOVA for the attitudes towards AIDS precautions with respect of the home language

		Sum of Squares	df	Mean Square	F	Sig.
Antiprecautions	Between Groups	60.360	4	15.090	1.656	.160
	Within Groups	2851.439	313	9.110		
	Total	2911.799	317			
Denial of risk	Between Groups	9.436	4	2.359	.265	.901
	Within Groups	2791.419	313	8.918		
	Total	2800.855	317			
Abrogation of responsibility	Between Groups	39.012	4	9.753	.915	.455
	Within Groups	3336.799	313	10.661		
	Total	3375.811	317			
Fatalism attitude	Between Groups	34.057	4	8.514	1.245	.292
	Within Groups	2141.364	313	6.841		
	Total	2175.421	317			

Table: 2

ANOVA for the attitudes towards AIDS precautions with respect of the religion

		Sum of Squares	df	Mean Square	F	Sig.
Antiprecautions	Between Groups	71.641	3	23.880	2.723	.044
	Within Groups	2859.159	326	8.770		
	Total	2930.800	329			
Denial of risk	Between Groups	44.843	3	14.948	1.697	.167
	Within Groups	2870.745	326	8.806		
	Total	2915.588	329			
Abrogation of responsibility	Between Groups	28.313	3	9.438	.908	.437
	Within Groups	3387.774	326	10.392		
	Total	3416.088	329			
Fatalism attitude	Between Groups	7.116	3	2.372	.362	.781
	Within Groups	2138.172	326	6.559		
	Total	2145.288	329			

Appendix (I)

T-tests for the attitudes towards AIDS precautions with respect to knowing personally someone with HIV/AIDS

Table: 1

Do you know personally someone with HIV/AIDS?

	Do you persinally know anyone with HIV/AIDS?	N	Mean	Std. Deviation	Std. Error Mean
Antiprecautions	Yes	119	4.1765	3.24598	.29756
	No	214	4.3131	2.89408	.19784
Denial of risk	Yes	119	7.1681	3.16313	.28996
	No	214	7.3084	2.86114	.19558
Abrogation of responsibility	Yes	119	5.2689	3.36658	.30861
	No	214	5.2664	3.16808	.21657
Fatalism attitude	Yes	119	5.1345	2.70255	.24774
	No	214	5.1916	2.52420	.17255

Table: 2

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Antiprecautions	Equal variances assumed	4.132	.043	-.395	331	.693	-.13661	.34583	-.81691	.54368
	Equal variances not assumed			-.382	221.411	.703	-.13661	.35732	-.84080	.56758
Denial of risk	Equal variances assumed	1.657	.199	-.413	331	.680	-.14034	.33989	-.80896	.52827
	Equal variances not assumed			-.401	224.099	.689	-.14034	.34976	-.82958	.54890
Abrogation of responsibility	Equal variances assumed	.361	.549	.007	331	.995	.00255	.37053	-.72633	.73143
	Equal variances not assumed			.007	231.702	.995	.00255	.37702	-.74027	.74538
Fatalism attitude	Equal variances assumed	1.316	.252	-.193	331	.847	-.05714	.29608	-.63957	.52530
	Equal variances not assumed			-.189	230.236	.850	-.05714	.30191	-.65200	.53773

Appendix (J)

Table: 1. Rotated Factor matrix for Pearson factor model

	Factor1	Factor2	Factor3	Factor4
1	0.10645	0.03103	0.14278	0.10737
2	0.15812	0.25249	0.07896	-0.13436
3	**0.75660**	0.09829	0.06722	0.05494
4	0.01108	**0.72928**	0.03411	0.01217
5	0.28594	0.27558	0.19347	**-0.41711**
6	0.17916	-0.00288	0.17695	-0.19539
7	-0.12206	-0.05075	0.08590	**0.61878**
8	0.06792	0.09355	**0.71623**	0.01603
9	0.00942	**0.58674**	0.11188	-0.35031
10	0.11687	**0.58905**	0.09756	0.00579
11	0.12071	0.15113	**0.63605**	0.11489
12	0.21296	0.27061	**0.40218**	-0.14970
13	-0.04012	-0.07241	-0.04144	**0.59120**
14	0.09037	-0.00615	0.20600	-0.19295
15	0.06582	0.11343	-0.12371	0.27969
16	**0.71012**	-0.05719	0.04693	-0.10030
17	**0.73704**	0.12801	0.11707	-0.10481
18	0.07970	0.11947	-0.05144	0.17701
19	-0.07418	-0.02082	0.02974	-0.17538
20	-0.17913	-0.14290	-0.12194	0.18213
21	0.26244	**0.42748**	0.21448	-0.42382
22	**0.47366**	0.00475	0.33569	-0.21604
23	0.11954	0.30503	0.15458	0.28891
24	0.11850	-0.13842	**0.60137**	-0.19969

	Factor5	Factor6	Factor7	Factor8
1	0.03555	**0.62282**	-0.01503	-0.00257
2	**0.56923**	0.23463	0.06001	-0.07843
3	0.06991	0.26498	0.02866	0.11304
4	-0.01002	-0.06820	0.04754	0.02520
5	0.01167	-0.00832	-0.32641	0.01792
6	**0.70199**	-0.02876	-0.12029	0.11649
7	0.02535	-0.05267	-0.21135	-0.14983
8	0.02210	-0.02017	0.08050	-0.14492
9	0.20426	-0.06596	-0.05707	-0.01032
10	0.16804	0.42414	0.11781	0.11820
11	0.09017	0.22582	0.13742	0.12098
12	-0.03128	0.18182	0.10225	0.20340
13	-0.26787	0.07705	-0.13157	0.11530
14	0.08866	-0.08491	**0.66018**	0.13480
15	**0.56440**	-0.09104	0.33040	0.01685
16	0.23994	0.01852	0.01090	-0.04923
17	0.13674	-0.04517	0.13225	-0.00734
18	0.11722	-0.17371	0.16970	**0.67401**
19	-0.05712	0.08995	-0.12455	**0.74956**
20	0.02537	-0.23425	**-0.59325**	0.15045
21	-0.03912	-0.35689	0.14488	-0.02058
22	-0.11549	-0.16431	0.14591	-0.07518
23	0.12103	**-0.51150**	-0.17223	0.20189
24	0.47406	-0.08915	-0.04807	0.01145

Appendix (K)
Table: 1. Rotated Factor matrix for Spearman factor model

	Factor1	Factor2	Factor3	Factor4
1	0.18313	-0.36336	0.31236	-0.01823
2	0.19400	0.15165	0.37605	**0.54594**
3	**0.75935**	-0.05968	0.20185	0.10832
4	-0.00561	0.14737	**0.65556**	-0.00463
5	0.25553	0.27197	0.23144	**0.42642**
6	0.20045	0.06747	-0.00376	**0.71080**
7	-0.16764	**-0.54863**	-0.09539	-0.16297
8	0.06362	0.07004	0.04326	0.08743
9	-0.03330	0.42100	**0.48620**	0.36545
10	0.19742	0.07080	**0.69862**	0.05356
11	0.18566	0.05615	0.26096	-0.01082
12	0.21331	0.23982	0.31291	0.10154
13	-0.12067	**-0.55518**	-0.06595	-0.31894
14	0.07094	**0.55436**	0.06876	-0.04671
15	0.04810	0.05934	0.09976	0.23971
16	**0.68403**	0.12972	-0.05918	0.28880
17	**0.71740**	0.27185	0.10643	0.10506
18	0.14830	0.06629	0.04516	-0.10342
19	-0.13719	-0.04364	0.03534	0.08318
20	-0.36341	**-0.44374**	-0.17709	0.21469
21	0.21127	**0.67538**	0.20231	0.10800
22	**0.48133**	0.29469	0.02325	0.00434
23	0.09242	-0.07445	0.16845	0.07493
24	0.11998	0.15618	-0.16268	0.51014

	Factor5	Factor6	Factor7	Factor8
1	0.22697	**-0.41612**	0.02081	0.00863
2	0.00818	-0.15238	-0.09901	0.15508
3	0.10097	-0.07673	0.09154	0.01282
4	0.06828	0.31007	0.01123	-0.05023
5	0.04047	0.09195	0.07500	-0.35687
6	0.14272	0.12591	0.11500	0.17289
7	0.09275	0.23566	-0.24949	0.07667
8	**0.73820**	0.06736	-0.11176	-0.12816
9	0.02803	0.07377	-0.03988	-0.07892
10	0.12102	-0.08152	0.07744	0.18242
11	**0.65162**	-0.02992	0.08986	0.17372
12	**0.35478**	-0.11907	0.22098	-0.09249
13	-0.08045	0.01370	0.11193	-0.04150
14	0.27357	-0.02096	0.06979	0.29831
15	-0.00299	0.04201	-0.06533	**0.72111**
16	0.04793	0.00497	-0.06702	0.08533
17	0.11704	0.09318	-0.01860	0.06698
18	0.00186	0.30034	**0.60542**	0.39026
19	-0.00491	-0.03119	**0.78082**	-0.17659
20	-0.18423	0.23929	0.15612	-0.15808
21	0.13111	0.25272	-0.05246	-0.10366
22	0.24660	0.13467	-0.11231	-0.21544
23	0.08117	**0.78014**	0.07976	0.04790
24	**0.57931**	0.05034	0.01599	0.08023

Appendix (L)
Table: 1. Polychoric correlation matrix

	1	2	3	4	5	6	7	8
1	1.00000	0.30400	-0.19700	0.42900	0.28800	0.24700	0.46100	0.42600
2	0.30400	1.00000	-0.18200	0.36900	0.31500	0.42200	0.26400	0.21900
3	-0.19700	-0.18200	1.00000	-0.32600	-0.22500	-0.36500	-0.14000	-0.11000
4	0.42900	0.36900	-0.32600	1.00000	0.29600	0.49500	0.25300	0.39200
5	0.28800	0.31500	-0.22500	0.29600	1.00000	0.36200	0.19300	0.28900
6	0.24700	0.42200	-0.36500	0.49500	0.36200	1.00000	0.23100	0.20900
7	0.46100	0.26400	-0.14000	0.25300	0.19300	0.23100	1.00000	0.18800
8	0.42600	0.21900	-0.11000	0.39200	0.28900	0.20900	0.18800	1.00000
9	0.22700	0.17600	-0.09500	0.17600	0.31200	0.16200	0.15600	0.35300
10	-0.00200	0.01900	-0.01200	0.06400	0.12600	0.10700	0.13700	0.18600
11	0.02200	0.05800	-0.07000	0.04200	0.06800	-0.04300	0.04600	0.04000
12	0.08300	0.05600	0.02200	0.12900	0.05300	0.22100	0.21000	0.04500
13	0.34400	0.27400	-0.17500	0.13700	0.26400	0.19400	0.24400	0.33500
14	0.30800	0.01200	-0.02200	0.14800	0.11600	0.09100	0.20000	0.09600
15	0.32400	0.25000	-0.22200	0.17400	0.25700	0.26100	0.35600	0.17900
16	0.33300	0.28300	-0.27900	0.28900	0.25800	0.44700	0.28700	0.26100
17	-0.27600	-0.10500	0.20500	-0.15100	-0.24800	-0.34500	-0.14100	-0.30200
18	0.31200	0.22600	-0.15800	0.25000	0.20500	0.26300	0.49500	0.12900
19	0.13900	-0.03400	-0.02900	-0.04300	0.15500	-0.09200	0.05800	0.16500
20	0.19900	0.19000	-0.13600	0.33500	0.19500	0.32100	0.12600	0.37000
21	0.20200	0.13200	-0.02300	0.19900	0.26100	0.24500	0.13200	0.14100
22	-0.34300	-0.30000	0.32900	-0.29600	-0.14400	-0.45300	-0.31500	-0.15200
23	0.28900	0.14500	-0.25900	0.24400	0.25600	0.35600	0.19400	0.24100
24	0.34700	0.29900	-0.15200	0.22200	0.26100	0.39300	0.16200	0.09300

	9	10	11	12	13	14	15	16
1	0.22700	-0.00200	0.02200	0.08300	0.34400	0.30800	0.32400	0.33300
2	0.17600	0.01900	0.05800	0.05600	0.27400	0.01200	0.25000	0.28300
3	-0.09500	-0.01200	-0.07000	0.02200	-0.17500	-0.02200	-0.22200	-0.27900
4	0.17600	0.06400	0.04200	0.12900	0.13700	0.14800	0.17400	0.28900
5	0.31200	0.12600	0.06800	0.05300	0.26400	0.11600	0.25700	0.25800
6	0.16200	0.10700	-0.04300	0.22100	0.19400	0.09100	0.26100	0.44700
7	0.15600	0.13700	0.04600	0.21000	0.24400	0.20000	0.35600	0.28700
8	0.35300	0.18600	0.04000	0.04500	0.33500	0.09600	0.17900	0.26100
9	1.00000	0.12400	0.00000	0.09000	0.24800	0.12000	0.20500	0.30600
10	0.12400	1.00000	0.20200	0.20200	0.12300	0.15600	0.04100	0.11300
11	0.00000	0.20200	1.00000	0.07200	0.00600	-0.05100	-0.07300	-0.06100
12	0.09000	0.20200	0.07200	1.00000	0.03200	0.06600	0.05700	0.11700
13	0.24800	0.12300	0.00600	0.03200	1.00000	0.11800	0.50300	0.59200
14	0.12000	0.15600	-0.05100	0.06600	0.11800	1.00000	0.18700	0.19000
15	0.20500	0.04100	-0.07300	0.05700	0.50300	0.18700	1.00000	0.53900
16	0.30600	0.11300	-0.06100	0.11700	0.59200	0.19000	0.53900	1.00000
17	-0.26400	0.02700	0.11500	0.10600	-0.26300	-0.07000	-0.23600	-0.36000
18	0.37700	0.04100	-0.04500	0.10100	0.20100	0.12100	0.27400	0.36000
19	0.18400	-0.03500	-0.02900	-0.05600	0.21600	0.03200	0.04500	0.08600
20	0.17900	0.07900	0.10900	0.25600	0.13000	0.08000	0.05800	0.19600
21	0.33500	-0.06000	-0.02700	0.04400	0.21100	0.06900	0.19600	0.20200
22	-0.14600	-0.04500	0.06700	-0.00900	-0.08600	-0.06700	-0.29300	-0.32400
23	0.23100	0.11100	0.02000	0.03400	0.21600	0.18800	0.19800	0.26700
24	0.23100	0.00600	-0.02900	0.13200	0.29200	-0.03600	0.35500	0.43000

	17	18	19	20	21	22	23	24
1	-0.27600	0.31200	0.13900	0.19900	0.20200	-0.34300	0.28900	0.34700
2	-0.10500	0.22600	-0.03400	0.19000	0.13200	-0.30000	0.14500	0.29900
3	0.20500	-0.15800	-0.02900	-0.13600	-0.02300	0.32900	-0.25900	-0.15200
4	-0.15100	0.25000	-0.04300	0.33500	0.19900	-0.29600	0.24400	0.22200
5	-0.24800	0.20500	0.15500	0.19500	0.26100	-0.14400	0.25600	0.26100
6	-0.34500	0.26300	-0.09200	0.32100	0.24500	-0.45300	0.35600	0.39300
7	-0.14100	0.49500	0.05800	0.12600	0.13200	-0.31500	0.19400	0.16200
8	-0.30200	0.12900	0.16500	0.37000	0.14100	-0.15200	0.24100	0.09300
9	-0.26400	0.37700	0.18400	0.17900	0.33500	-0.14600	0.23100	0.23100
10	0.02700	0.04100	-0.03500	0.07900	-0.06000	-0.04500	0.11100	0.00600
11	0.11500	-0.04500	-0.02900	0.10900	-0.02700	0.06700	0.02000	-0.02900
12	0.10600	0.10100	-0.05600	0.25600	0.04400	-0.00900	0.03400	0.13200
13	-0.26300	0.20100	0.21600	0.13000	0.21100	-0.08600	0.21600	0.29200
14	-0.07000	0.12100	0.03200	0.08000	0.06900	-0.06700	0.18800	-0.03600
15	-0.23600	0.27400	0.04500	0.05800	0.19600	-0.29300	0.19800	0.35500
16	-0.36000	0.36000	0.08600	0.19600	0.20200	-0.32400	0.26700	0.43000
17	1.00000	-0.12300	-0.13300	-0.14400	-0.17100	0.29400	-0.33600	-0.32400
18	-0.12300	1.00000	0.03100	0.02400	0.34900	-0.28700	0.27200	0.26300
19	-0.13300	0.03100	1.00000	0.03000	0.06700	0.00100	-0.02700	0.05900
20	-0.14400	0.02400	0.03000	1.00000	0.15800	-0.21000	0.15500	0.09200
21	-0.17100	0.34900	0.06700	0.15800	1.00000	-0.15700	0.19900	0.24400
22	0.29400	-0.28700	0.00100	-0.21000	-0.15700	1.00000	-0.25700	-0.24700
23	-0.33600	0.27200	-0.02700	0.15500	0.19900	-0.25700	1.00000	0.31900
24	-0.32400	0.26300	0.05900	0.09200	0.24400	-0.24700	0.31900	1.00000

Appendix (M)

Table: 1. Rotated Factor matrix for Polychoric factor model

	Factor1	Factor2	Factor3	Factor4
1	0.22582	-0.21356	0.31555	**0.58198**
2	0.27057	-0.21545	0.31199	0.39462
3	-0.14627	**0.66478**	-0.06251	-0.14798
4	0.00607	-0.37217	**0.57103**	0.38306
5	0.20814	-0.27055	0.26208	0.09350
6	0.28803	**-0.53142**	0.41818	0.11260
7	0.22490	-0.03591	0.05628	**0.75692**
8	0.13809	-0.13240	**0.60437**	0.08820
9	0.16359	-0.03871	0.16471	0.05050
10	0.15956	0.00129	0.10883	-0.07283
11	-0.11683	-0.02547	0.02976	0.07255
12	0.19396	0.35257	0.42708	0.09161
13	**0.77767**	-0.01299	0.10776	0.09388
14	0.06782	-0.04630	0.09237	0.29073
15	**0.72706**	-0.13815	-0.04355	0.29948
16	**0.76100**	-0.23750	0.14553	0.14494
17	-0.30654	**0.52302**	-0.13226	0.17587
18	0.14213	-0.11355	-0.13374	**0.59150**
19	0.16017	0.15254	0.06223	0.00419
20	0.03367	-0.06147	**0.78991**	-0.01521
21	0.06663	-0.01772	0.09749	0.12976
22	-0.13301	**0.54806**	-0.14833	-0.36879
23	0.12405	**-0.57152**	0.05370	0.01292
24	**0.53163**	-0.25676	0.06173	0.03391

	Factor5	Factor6	Factor7	Factor8
1	0.10402	0.27409	-0.07086	0.16829
2	0.05039	-0.02690	0.08605	**-0.41678**
3	0.10497	-0.03325	-0.16048	0.11162
4	0.08185	-0.03619	0.01545	-0.06451
5	**0.37722**	0.19913	0.24401	-0.09099
6	0.19502	-0.35656	-0.04327	-0.09628
7	0.11250	-0.04380	0.09671	0.16371
8	0.15824	0.42707	0.11549	0.18446
9	**0.68991**	0.20665	0.10949	0.12387
10	0.02738	-0.19196	**0.64649**	0.41275
11	-0.02731	0.05728	**0.78820**	-0.18792
12	0.11564	**-0.54040**	0.14463	0.10330
13	0.08741	0.29851	0.11366	0.03607
14	-0.01616	0.02639	-0.04042	**0.72744**
15	0.04579	0.02591	-0.05234	0.05970
16	0.15207	-0.02774	-0.03057	0.08872
17	-0.25035	-0.22808	0.21889	-0.17281
18	0.55705	-0.10944	0.00473	0.04403
19	0.14034	**0.64304**	-0.01966	-0.00364
20	0.08446	-0.04753	0.02761	0.02112
21	**0.73480**	0.00059	-0.13434	-0.09418
22	-0.05321	0.13080	0.15934	0.01031
23	0.36027	-0.07229	0.10130	0.31274
24	0.35354	-0.15485	-0.07650	-0.21262