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**Assessing and Changing Attitudes and Behaviors Toward Intimate Partner Violence in Southern
Africa as a Primary Prevention Method for HIV Infection**

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**Assessing and Changing Attitudes and Behaviours toward
Intimate Partner Violence in Southern Africa as a Primary
Prevention Method for HIV Infection**

Alison Riddle

Thesis submitted to the Faculty of Graduate and Postdoctoral Studies
In partial fulfillment of the requirements
For the MSc degree in Epidemiology and Community Medicine

Department of Epidemiology and Community Medicine
Faculty of Medicine
University of Ottawa

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Abstract

Reducing intimate partner violence levels in southern Africa is a necessary component of an effective HIV primary prevention strategy. A prerequisite to behaviour change is a shift in attitudes. This study sought to identify effective ways of assessing and changing attitudes and behaviours towards IPV to prevent HIV infection in a developing country context. Combining a systematic review of current evidence with advanced statistical analyses of data from a southern Africa regional household survey (n = 20,639), *Soul City Regional Evaluation Phase 1*, findings indicate that: a gold standard to measure IPV attitudes and behaviours is needed; interventions targeting structural change and based in the community are more effective; the effectiveness of mass media interventions may not be robust; the interaction of different prevention interventions may mediate overall effectiveness. Exploratory factor analysis, multiple imputation, and regression techniques were applied to complex, multileveled, and correlated data with missingness.

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Abbreviations

AIDS	Acquired Immune Deficiency Syndrome
ART	Anti-Retroviral Therapy
BCC	Behaviour Change Communication
EFA	Exploratory Factor Analysis
GBV	Gender-Based Violence
GEE	General Estimating Equation
HIV	Human Immunodeficiency Virus
IEC	Information, Education, Communication
IPV	Intimate Partner Violence
KAP	Knowledge, Attitude, and Practices
LMICs	Low- and Middle-Income Countries
MI	Multiple Imputation
ML	Maximum Likelihood Estimation
NGO	Non-Governmental Organization
PPASA	Planned Parenthood Association of South Africa
SBC	Strategic Behaviour Change
SR1	Soul City Regional Evaluation
STI	Sexually Transmitted Infections
UNAIDS	Joint United Nations Programme on HIV/AIDS
VAW	Violence Against Women
VCT	Voluntary Counselling and Testing
WHO	World Health Organization
YFH	Young Female Hawkers

1.0 Introduction

At the end of 2007 there were approximately 33.2 million people living with HIV worldwide, 15.4 million (46.4%) of who were women and 2.5 million (7.5%) children (1). In that year alone, 2.5 million people became newly infected and 2.1 million deaths globally were attributed to AIDS (1). According to UNAIDS, “The HIV pandemic remains the most serious of infectious disease challenges to public health” (1).

AIDS is the leading cause of death in sub-Saharan Africa (1). The region represented 67% of people living with HIV globally, and 75% of deaths due to AIDS in 2007 (2). The majority of people living with HIV (61%) in sub-Saharan Africa are women. Young women (15-24 years) are more than three times more likely to contract HIV than their male counterparts (3). Southern Africa remains the most heavily affected region in the world (1). National adult HIV prevalence is above 15% in Botswana, Lesotho, South Africa, Swaziland, Mozambique, Namibia, Zambia and Zimbabwe (2). A 2004 UNAIDS publication reports that in South Africa, Zambia and Zimbabwe, young women are three to six times more likely to be infected than men (4).

The seriousness of the HIV/AIDS epidemic in sub-Saharan Africa is inextricably linked to the poverty and structural inequalities found on the continent (5). The infection is primarily spread through heterosexual transmission. The determinants of HIV spread are bio-medical (stage of infection, gender, presence of other STIs, etc.), behavioural (concurrent partners, sexual mixing patterns, sexual practices, condom use, etc.), and environmental (culture, income distribution, religion, governance, access to health care, levels of violence, etc.) (5).

Women are more vulnerable to infection for physiological, structural and cultural reasons. Biologically, women are more vulnerable to heterosexual transmission of HIV than men because of increased mucosal exposure to seminal fluids. Forced sex and rape increase the danger further because of tearing and other damage to tissue. Culturally, women are often expected to obey their husbands and submit to their sexual preferences. While men are permitted to have multiple sexual partners in order to assert their masculinity, women are to

remain faithful. Efforts by women to encourage condom use by their male partners can be interpreted as a sign that she has been unfaithful. Consequences can include physical violence, abandonment, and emotional abuse.

In terms of structural constraints, women often have limited economic power which makes them more dependent on their male partners. This again limits their ability to negotiate safer sex. Poor protection of women's rights by the legal and judicial systems further exacerbates the situation as women have very few options other than to stay with an unfaithful or abusive husband. In many cases, due to lower education levels, women are not aware of their legal rights, even if the system was in a position to enforce them.

1.1 Intimate partner violence

Intimate partner violence (IPV) refers to any behaviour perpetrated in an intimate relationship that causes physical, sexual or psychological harm (6). It is one of the most common forms of violence against women (6-9). Other terms that are often used to describe IPV are domestic violence, battering, and wife/partner/spouse abuse. Formal definitions of IPV vary, and there is no one standard that is followed across disciplines. Violence against women is now recognized as a serious human rights and public health challenge, yet there remains a dearth of comprehensive information and research on the issue (6;10).

The prevalence of IPV varies from country to country, but is often under-reported (11;12). The World Health Organization (WHO) 2002 *World Report on Violence and Health* observed that the prevalence of domestic violence is a new area of research and that data on various types of partner violence, beyond physical assault, are not yet available (6). Most surveys are likely to underreport abuse because women are often reluctant to disclose their exposure because of feelings of shame, self-blame, loyalty to the abuser or fear (11). Moreover, women in some cultures believe that violence is a legitimate form of discipline for men to use on women, thus they will not report themselves as being abused (6;11).

To build on the limited knowledge base available, the WHO conducted a multi-country study on women's health and domestic violence from 2000 to 2003 (9). The study found

that the proportion of women who have ever experienced physical violence by a male partner ranged from 13% in Japan to 61% in Peru (9). They also observed that lifetime prevalence of IPV for women ranged from 15% (Japan) to 71% (Ethiopia) (7). The study confirmed that women were at the greatest risk of violence from an intimate partner, and that there was a significant overlap between physical and sexual violence by intimate partners (7).

Why violence against women is so pervasive in certain societies is not well understood. Levinson identified four societal factors that were predictors of increased levels of violence against women. They were: economic inequality between men and women, a pattern of using physical violence for conflict resolution, male authority and decision-making in the home, and divorce restrictions for women (11). Factors that operate to perpetuate gender-based violence are cultural (e.g. definitions of gender roles, marriage customs), economic (e.g. women's dependence on men, discriminatory inheritance laws), legal (e.g. lower levels of legal literacy among women, insensitivity of the judicial systems to women's issues), and political (e.g. under-representation of women in politics, domestic violence not seen as a serious problem) (11). These findings correspond to the results of the WHO multi-country study that showed that the prevalence of partner violence was lower in more industrialized settings, suggesting that women in these settings might have more options for leaving abusive relationships (7).

In 2007, Morrison, Ellsberg and Bott conducted a critical review of effective ways to increase access to justice for women who experienced gender-based violence, offer quality services to survivors, and reduce levels of gender-based violence. Their work highlighted emerging best practices while also recognizing the dearth of high quality studies available. According to Morrison et al, risk factors for gender-based violence include (13):

- At the individual level: witnessing intimate partner violence as a child, suffering abuse as a child, having an absent or rejecting father, HIV status of man or woman;
- At the relationship level: male control of household decision making and wealth, controlling behaviour by the husband, multiple partners or wives for the husband, number of unions for the woman, economic hardship, male alcohol and substance abuse, association with gang members, delinquent or patriarchal peers;

- At the community level: high neighbourhood crime rate, absent or maladaptive teaching of alternatives to violence, lack of economic opportunities for men; and
- At the societal level: cultural norms that support violence as an accepted way to resolve conflicts or punish transgressions, norms that support male dominance over women and that require women's obedience and sexual availability; and policies and laws that discriminate against women in social, economic and political spheres.

In terms of emerging evidence on protective factors, Morrison et al found that women with higher education levels and who were older were less likely to be victims of gender-based violence.(13).

1.2 IPV and HIV/AIDS

Women are more vulnerable to HIV infection because of gender inequalities and gender-based violence (14). Violence against women is recognized as a driver of the HIV epidemic in the region. Women are directly vulnerable through sexual violence, and indirectly through sexual risk taking, their inability to negotiate condom use, and cultural practices that encourage older men to have sexual relationships with younger women. Furthermore, women who are HIV-positive are more likely to experience physical violence as a result of their status (14). Fear of violence will discourage women from finding out their HIV status or seeking treatment, care and support, which increases the chance of them unknowingly passing on the virus to their partner(s) or unborn or nursing children.

Dunkle et al estimated that the prevalence of physical/sexual partner violence experienced by women attending antenatal clinics in Soweto, South Africa was 55% (15). The Global Coalition on Women and HIV/AIDS reported the following disturbing statistics (16):

- Women attending antenatal care in Soweto, South Africa who experiences partner violence were 1.5 times more like to be HIV-infected.
- Women in another South Africa study who experienced forced sex were nearly 6 times more likely to experience inconsistent condom use.

- A study from sub-Saharan Africa showed that women who disclosed their status were between 3% and 15% more likely to experience blame, abandonment, anger and violence.

A study conducted in Dar Es Salaam, Tanzania, showed that there were complex interactions among violence, forced sex and infidelity in the sexual relationships of young men and women. Men who were violent towards their female partners were more likely to describe forced sex and sexual infidelity in their partnerships. The authors concluded that HIV prevention interventions that fail to take into account infidelity, violence and forced sex would have limited impact (17).

1.3 Behaviour change theories

There is considerably more evidence and research to support the use of behaviour change communication (BCC) for HIV prevention than in the case of IPV prevention. The likely reason for this is the significantly higher levels of investment in the HIV/AIDS sector. Data from HIV BCC programs show that while many men and women have sufficient knowledge on how to protect themselves from HIV infection, the translation of this knowledge into behaviour change is not emerging to the extent that was intended or hoped (18;19). The challenge is that behaviour is highly individual yet is also shaped by a myriad of external and influencing factors – such as culture, social systems, and environmental and economic characteristics.

Many behaviour change theoretical models exist and have been applied to HIV prevention. Historically, models that focus on individual-level change have dominated HIV prevention, such as the Health Belief Model, the AIDS Risk Reduction Model, the Stages of Change Model, and the Theory of Reasoned Action (20). However, a limitation of these models is that they do not take into consideration other factors, such as environmental and socio-economic factors, and the influence of social norms that have an impact on health behaviours. Examples of behaviour change programming for HIV/AIDS prevention at the individual level include: information, education and communication strategies such as mass and small group education and peer education; and voluntary testing and counselling

services to encourage people to know their status and make informed decisions about their risky behaviours. UNAIDS examined existing evidence and identified the following key elements of successful individual-focused interventions: increasing participants' ability to communicate effectively about sex, helping participants improve their condom use skills, personalizing risk, and providing reinforcement and support for sustainable risk reduction (18).

Social theories of behaviour change see individual models within their social and cultural contexts. Examples include the Diffusion of Innovation Theory, Social Network Theory, Social Influence or Social Inoculation Theory, and Theory of Gender and Power (21). Social theories assert that an individual's peers have the most influence on his or her behaviour, and that effective prevention efforts need to adopt community mobilization strategies to modify norms that will allow an individual to change his or her behaviour for the better.

Going one step further are structural models that see sexual behaviour as a product of not only individual and social factors, but their surrounding environment as well. Models such as the Empowerment Model and the Social Ecological Model for Health Promotion target organizations, communities and policies, as opposed to individuals (21). These approaches switch the focus from psychological processes to social norms and relationships as the primary drivers of behaviour change.

In terms of community-based behaviour change interventions, strategies include: outreach interventions; school-based interventions; condom promotion and social marketing; community organizing; empowerment and participatory action research; and policy level interventions (18). The contribution of community-level interventions is the creation of an environment that supports long-term individual behaviour change.

It has been argued that the individual and structural approaches to behaviour change are not sufficient. Evans and Lambert contended that existing theories are insufficient because they

do not take into account the influences of human agency, subjective meaning, and local context on individuals' every day actions (22).

Building on these theories, CIET, an international group of epidemiologists and social scientists who bring scientific research methods to local government and community levels, has developed a behaviour change model that encapsulates the intermediary steps from information to action. According to CIET, "For every behavioural outcome there are intermediate stages on the way to a particular action or practice. Making these stages explicit can help in specifying indicators to be measured in studies of interventions aimed at changing a practice or behaviour. Using concepts from social psychology and decision theory, CIET uses the acronym CASCADA to describe an unpredictable but broadly sequential flow through conscious knowledge, attitudes, subjective norms and positive deviation from subjective norms, the intention to change, the sense of agency (collective and individual) that change is possible, discussing it and finally, making the behaviour change" (23). CIET acknowledges that the progression through the cascade is not fixed, nor is the importance of each step in the cascade the same for each individual. What the cascade does impart, however, is that the intention to change is more important than a positive attitude, and that agency counts for more towards behaviour change than an intention to change, and so on (23-25).

CASCADA incorporates both individual and social theories of behaviour change. Individual characteristics such as knowledge, attitudes, and intention to change are included in the model, as well as social considerations (subjective norms, community agency, discussion of behaviour change with others, etc.). A sense of individual or community agency can also reflect structural considerations – i.e. are there laws or economic barriers, for example, inhibiting an individual or community's belief that they may take action.

The role of attitudes in affecting behaviour change continues to be explored. The International Dating Violence Study showed that the higher the rate of individuals with accepting attitudes towards violence, the higher the percentage of individuals who assaulted a dating partner (26). Cate et al also documented a link between attitudes toward IPV and its

occurrence (27). This evidence, though limited, suggests the importance of studying attitudes when addressing the problem of IPV.

1.4 IPV and HIV prevention

Responses to HIV/AIDS can be categorized as bio-medical, behavioural and environmental. Bio-medical responses (condom promotion, STI treatment, circumcision, and anti-retroviral therapy (ART)) can contribute appreciably to HIV prevention, but they are ultimately subject to the influences of behavioural and environmental factors that can render the bio-medical approach ineffective. In comparison, affecting change in behavioural and environmental contributors to HIV spread is considerably more complicated. Strategic behaviour change (SBC), voluntary counselling and testing (VCT), legal reform, and changes to social policy are just a few examples, and are all needed to address the structural causes of the epidemic.

Addressing IPV as a driver of the HIV/AIDS epidemic is a key strategy for success. IPV prevention gets at the issue of primary prevention of HIV – preventing new infections by reducing individuals' vulnerability and risky sexual practices. This differs from secondary prevention (preventing conversion of HIV-positive people from HIV to AIDS) and tertiary prevention (reducing the negative and challenging effects of the illness, improving quality of life, and preventing death).

Morrison et al. identified some general findings in terms of emerging effective strategies for IPV prevention (13). They were:

- Increasing awareness and changing attitudes is easier to achieve in the short term than changing violent behaviour;
- Violence prevention requires community wide interventions that address social and cultural factors;
- Mass media campaigns and community-based education can raise awareness and increase knowledge but their impact on violence levels is unclear;
- Community-based projects are showing promising results in reducing violence levels; and

- “Edutainment” approaches, where radio and television are used to promote health and social change, are also showing promising results on changing violent attitudes and views on gender equality.

In addition, they concluded that prevention programs need to focus on changing the attitudes and behaviours of young men. Programs cannot focus solely on equipping women and girls to protect themselves. The authors noted that research has found that it is easier to change the attitudes and behaviours of boys and younger men (13).

According to the Global Coalition on Women and AIDS, promising strategies for combined HIV and IPV prevention include: behaviour change communication (BCC), responding to violence against women through health services, micro-credit interventions for economic empowerment of women, and strengthening laws and policies related to domestic violence and gender equality (28).

A report by the Global HIV Prevention Working Group entitled, *Behaviour Change and HIV Prevention: [Re]Considerations for the 21st Century*, concluded that the evidence base for behavioural HIV prevention is robust, but not complete. According to the report, “Effective HIV prevention addresses the specific needs and circumstances of the target population and aims to affect multiple determinants of human behaviour, including individual knowledge and motivations, interpersonal relationships, and societal norms. Community engagement and strong political support have been key ingredients of successful national efforts to change behaviour to prevent HIV infection” (29).

These previous findings were not reported to have been evaluated in a systematic manner. In contrast, the WHO published a 2006 Technical Report Series evaluating behaviour change interventions for HIV prevention in developing countries through the application of a series of systematic reviews (30). While not focused on IPV specifically, some lessons can be taken from the HIV context. The publication concluded the following about different intervention types:

Interventions recommended for widespread implementation and have a satisfactory evidence base:

- School-based interventions led by adults
- Radio with other media and/or television
- Interventions with health service providers and facilities and in the community

Interventions that are effective but large-scale implementation must be accompanied by further evaluation:

- Targeting youth through existing youth-service organizations in communities

Interventions that are promising but require further pilot-testing and evaluation:

- School-based interventions led by peers
- Targeting the community through community events or traditional networks

Interventions that lack effectiveness or do harm:

- Interventions with health service providers that do not include facilities or involve other sectors
- Targeting youth through new structures

Along a similar vein, Kirby et al concluded that school-based interventions were effective in reducing risky sexual behaviour in developing countries (31). A Cochrane Review of mass media interventions showed them to have a immediate impact on HIV testing uptake, but no long terms effects were demonstrated (32).

Reviews by other authors have not always agreed with the results above. For example, a systematic review by Bertrand et al of mass communication interventions to change HIV-related behaviours produced mixed results, and where results were statistically significant, the effects were low to moderate (33). These differences in conclusions are not surprising given the dearth of rigorous evaluation of mass media interventions. Bertrand et al concluded, in a similar vein as the Cochrane review above, that more rigorous evaluation of

comprehensive interventions is needed to provide a more definitive conclusion as to the effects of mass media interventions on HIV/AIDS-related behaviours.

1.5 Measuring IPV

Research into measuring intimate partner violence has focused more on developing accurate measures for incidence or prevalence, and secondarily on measuring attitudes and behaviours (34;35). The limited numbers of tools that do exist are outlined below.

The Conflict Tactics Scale by Straus is one of the most widely used scales to measure violence in intimate relationships (36). It has been adapted over the years to measure victimization within couples (CTS-2) and parent-child relationships (CTSPC). The CTS has been criticized for not providing information on the context within which violent acts occur, and omits measures for economic abuse, manipulation involving children, isolation, or intimidation. The scale is focused on behaviours, and not attitudes.

More recently, Smith et al used the definition of IPV from the Centers for Disease Control and Prevention in the United States and a review of existing prevalence measures to derive a pool of potential items reflecting the construct of violence in intimate relationships (35). The resulting Intimate Partner Violence Attitudes Scale (IPVAS) includes 17 items assessing attitudes representing psychological and verbal abuse, control, and physical violence. A principle components analysis showed the scale was composed of three factors: Abuse, Control and Violence.

Fincham et al built on Smith's work and tested it with a larger sample to (a) replicate and cross validate the factor structure, (b) subject it to evaluation via confirmatory factor analysis, and (c) provide data on its concurrent and predictive validity. They were able to replicate the factor structure that Smith found, with some modifications, and provided the first predictive and validity data for the measure (34).

Pulerwitz and Barker have developed the Gender-Equitable Men Scale (GEM) to directly measure attitudes toward "gender-equitable" norms (37). While not specifically intended to

measure IPV, the objective was to develop a measure that would assist in determining the relationship between gender norms, violence and HIV/STI risk. The scale has 24 items with two subscales: Egalitarian norms and Traditional norms, and has been found to be a reliable measure (38).

1.6 Study objectives

The objective of this study is to contribute to the body of literature on the intersection of HIV/AIDS and intimate partner violence by:

1. Assessing the efficacy of existing interventions to prevent or reduce IPV in developing countries.
2. Analyzing the relationship between individuals' views on intimate partner violence and their source of knowledge on HIV/AIDS.
3. Providing recommendations for further research and practice in the area of HIV/AIDS and IPV prevention.

1.7 Overview of chapters

The chapters in this study progress through a series of analyses exploring IPV prevention in the developing country context. It begins with a systematic review to establish what is currently known about effective IPV prevention interventions. The study moves on to analyzing a large, existing data set to identify ways in which HIV education programs are influencing person's views on intimate partner violence.

Chapter 2 provides a systematic review of existing experimental and quasi-experimental studies designed to reduce or prevent IPV in developing countries. The purpose is to identify evidence-based interventions that can be reproduced or scaled-up in a developing country setting. The *Cochrane Handbook for Systematic Reviews of Interventions* Version 5.0.1 is used as a general guide (39).

Chapter 3 employs advanced statistical methods that will accommodate complex, multilevel data structures with correlated data using *Mplus 5.0* to analyze data from a 2002-2003 household survey in southern Africa that was designed to measure the impact of education-

entertainment messages on HIV prevention in the region. More specifically, Chapter 3 applies exploratory factor analysis to 17 IPV variables from the household survey, a complex data sample, to identify underlying latent constructs, thereby reducing the number of variables to analyze and identifying key factors that explain individuals' views on IPV. Multiple imputation methods were used to handle missing data. Ethics approval for the use of the data in this study was received from the Ontario Hospital Ethics Board (Appendix A).

In Chapter 4, again using complex, multilevel data structures and multiple imputation, the association between these constructs, or factors, with survey respondents' self-identified sources of knowledge about HIV is investigated using the regression analysis routines in Mplus 5.0 to ascertain whether any sources can be associated with more healthy views on intimate partner violence. The types of HIV knowledge sources explored include schools and workplaces, peers, religiously-affiliated institutions, and the media, among others.

Chapter 5 brings together the results of the previous chapters in a final discussion and conclusion. It links the lessons learned about effective IPV prevention interventions in Chapter 2 with the findings of chapters 3 and 4, namely, the sources of knowledge that were associated with more healthy views on IPV. The final chapter highlights the main findings of the study, provides recommendations for improved programming in HIV/AIDS and IPV prevention, and suggests areas for further research.

2.0 Systematic review of intimate partner violence prevention interventions in developing countries

2.1 Background

As the previous chapter highlighted, intimate partner violence is the most common form of violence against women globally, yet it was not widely recognized as a serious public health issue until the World Health Organization came out with its 2002 landmark publication, *World Report on Health and Violence*. Since then, more and more efforts have gone into furthering our knowledge and understanding of the causes and consequences of IPV in order that effective prevention strategies can be developed and implemented.

When looking at the developing world, especially sub-Saharan Africa, IPV and HIV/AIDS are inextricably linked. There is a growing body of evidence that shows that violence against women has both direct and indirect consequences for women's susceptibility to HIV infection (41). Gender inequalities are recognized as one of the drivers of the HIV epidemic, and consequently, are also a barrier to prevention (42).

IPV prevention programs take on a variety of forms, including mass media campaigns, community-based projects, and peer education, among others. The effectiveness of these different intervention types have not been evaluated in a systematic manner in a developing country context. Despite the variety in intervention designs, all seek to influence behaviour change in a positive way. Determining which, if any, of these intervention types show positive results in reducing IPV would go a long way to furthering research in this area.

2.2 Review objectives

Behaviour interventions have been posited as one of the more promising prevention strategies for both HIV transmission and intimate partner violence. Building on this conjecture, this review systematically examined and summarized the effects of different behavioural interventions to prevent or reduce intimate partner violence among women and men in developing countries. Given that this review looked at different intervention types,

and not at a series of trials replicating one intervention, the possibility of undertaking a meta-analysis was ruled out from the beginning.

The objectives were to:

1. Locate and describe available outcome studies evaluating the effects of behavioural interventions to prevent or reduce IPV.
2. Summarize the effectiveness of these interventions among women and men in developing countries.
3. Identify gaps and indicate future research, policy, and practice needs.

2.3 Criteria for selecting reviews

2.3.1 Types of studies

Randomized controlled trials and other quasi-experimental study designs were included. Quasi-experiments are similar to experimental designs in that they test descriptive causal hypotheses about manipulable causes, and often include structural details such as control groups and pre-test measures. However, by definition, they do not apply random assignment. Assignment is by self-selection or administrator selection (43).

2.3.2 Types of participants

Participants were adult men and women (16 years or older) residing in developing countries regardless of race/ethnicity, nationality, sexual orientation, income, employment status, or education level.

2.3.3 Types of interventions

Behavioural interventions with a primary or secondary aim of promoting healthy views on IPV or reducing IPV incidence were included. These interventions may have been delivered to individuals, small groups, or communities.

2.3.4 Types of outcome measures

Eligible outcome measures were rates of IPV, and measures of individuals' knowledge, attitudes and practices (KAP) related to IPV.

2.4 Search strategy for identification of articles

An electronic search was conducted of Medline, Ovid HealthStar, EMBASE, Cochrane Database of Systematic Reviews, and Cochrane Central Register of Controlled Trials using the OVID interface (conducted 21 February 2009). Abstracts were first examined for relevance, followed by the entire text if questions relevance was still not clear. The final search strategy can be found in Appendix B. The search was limited to English language publications.

2.4.1 Other sources

Reference lists of the potentially relevant publications were examined and experts in the field of IPV were contacted to assist in the identification of unpublished studies. A search for relevant studies and other resources was conducted on the World Wide Web using the Google search engine. Search terms included: sexual violence / domestic violence / partner violence / prevention / study / trial.

2.5 Methods of the review

The study's primary author selected included studies, undertook data extraction and management, assessed methodological quality, and interpreted results. The thesis supervisor reviewed the extracted data. When questions arose, the study author consulted her thesis advisor and problems were resolved together.

2.5.1 Selection of studies

Studies were reviewed for scope based on types of participants (adult women and men from developing countries), interventions (behavioural intervention to prevent or reduce IPV), and outcomes (KAP related to IPV, IPV incidence).

2.5.2 Data extraction and management

A data collection form was developed and applied to each study (Appendix C). The collected data were then compared to the original sources to ensure accurate data abstraction.

2.5.3 Assessment of methodological quality of included studies

Methodological quality was assessed by application of the Effective Public Health Practice Project's *Quality Assessment Tool for Quantitative Studies* (Appendix D). The EPHPP tool was designed to evaluate selection bias, allocation bias, control for confounders, blinding, data collection methods, management of withdrawals and dropouts, statistical analysis, and intervention integrity, in RCTs, quasi-experimental designs, and observational studies. The results of the methodological quality assessment determined which studies would be excluded from the review's conclusions due to study design deficiencies.

2.5.4 Measures of treatment effect

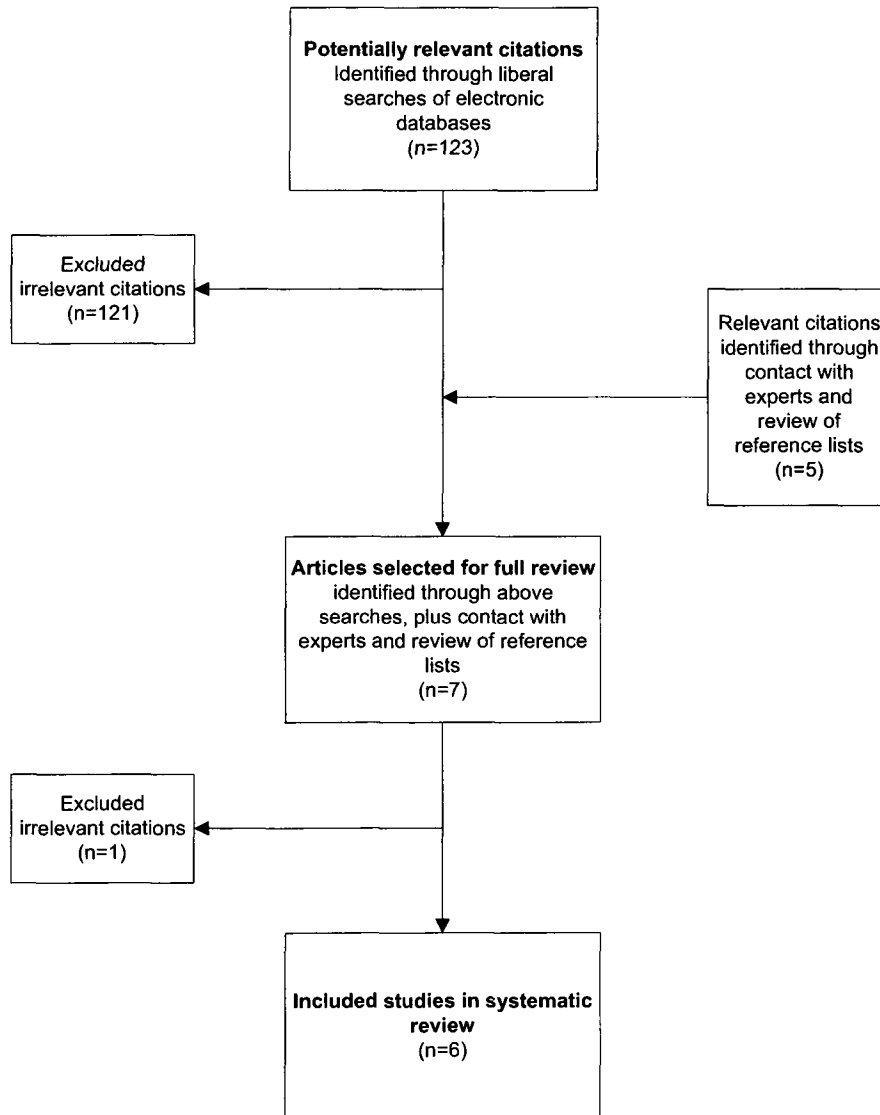
The unit of analysis was the individual. Accepted relative measures included risk ratios, odds ratios and hazards ratios. Accepted absolute measures were risk differences and numbers needed to treat.

2.6 Description of the studies

2.6.1 Results of the search

The electronic search of Medline, EMBASE, HealthStar, the Cochrane RCT Register, and the Cochrane Systematic Review Register identified 123 possible publications. The complete search strategy and results are in Appendix B. The titles and abstracts of the articles were reviewed and two articles were selected for full review. Five additional studies were identified through a search of reference lists and contact with selected authors for a total of 7 articles. One article was removed because the study outcomes were not related to IPV. Ultimately, three cluster RCTs and three quasi-experimental studies were identified for inclusion in the systematic review.

Figure 2.1. Search strategy flow diagram



2.6.2 Included studies

The search strategy produced six studies that included 15,842 participants. Characteristics of included studies are summarized in Table 2.1.

Table 2.1. Characteristics of included studies

Study	Methods	Country	N (% female)	Age	Description	Setting	Study length in months	IPV outcome(s)
Pronyk	Cluster RCT	South Africa	843 (100)	41 ^a	Training and microfinance	Community	24	Experience of IPV in last 12 months
Ross	Cluster RCT	Tanzania	9645 (45)	15.7 ^c	Training	School and community	36	KAP ¹ of sexual attitudes
Jewkes	Cluster RCT	South Africa	2776 (51)	15-26 ^b	Training	School and community	24	More than one incident of physical/sexual IPV at 12 and 24 months
Usdin	Quasi- experimental	South Africa	1979 (64)	16-65 ^b	Mass media	n/a	9	KAP of IPV
Fawole	Quasi- experimental	Nigeria	345 (100)	23.5 ^c	Training and microfinance	High traffic motor parks	19	KAP of IPV
MAP	Quasi- experimental	South Africa	254 (0)	29 ^c	Training	Community	18	KAP of IPV

^a median

^b range

^c mean

¹ Knowledge, Attitudes, Practice

Study design

Three studies (Pronyk, Ross, Jewkes) used a cluster RCT design. Villages or communities were randomly allocated to either the intervention or comparison/control arms. Pronyk used a pair-match design at the village level. The remaining three studies (MAP, Fawole, Usdin) were quasi-experimental designs that applied a one-group pre-test/post-test-only design. One study (MAP) used a within-participants design.

Sample sizes

Sample sizes at baseline varied from 254 (MAP) to 9,645 (Ross). There was reference to a sample size calculation by Pronyk et al, but details were not provided. Jewkes and Ross provided detailed explanations of sample size calculations. The remaining studies did not report on sample size.

Settings

All studies were conducted in sub-Saharan Africa – four in South Africa (MAP, Usdin, Pronyk, Jewkes), one in Tanzania (Ross) and one in Nigeria (Fawole). Five studies took place in a community or village setting, while the remaining one (Fawole) was implemented in high traffic motor parks. All studies targeted behaviour change at the individual level.

Participants

Target populations varied by study. The general population was the target of the Usdin study. Pronyk targeted women only (median age 41 years). MAP targeted men who frequented the Planned Parenthood Association South Africa (PPASA) offices (mean age 29 years). Ross and Jewkes targeted adolescents (male and female) via schools. Fawole targeted young female hawkers (YFH) working in motor parks (mean age 23.5 years). YFH are women selling goods on small trays balanced on their heads. Hawking of goods is often an entry point into trading for young girls to help supplement family income.

Interventions

All interventions sought to change attitudes and/or behaviours related to IPV.

Information provision/training: Five studies implemented a type of information provision or training program (MAP, Pronyk, Fawole, Ross, Jewkes) to affect individuals' knowledge, attitudes and/or practices related to IPV. Two studies (Pronyk, Fawole) included microfinance schemes to complement the training.

One study (Pronyk) provided 10 sessions every two weeks for approximately 6 months to women who applied for a loan in the intervention village. Controls were pair-matched according to age, sex and village. Sessions were facilitated by a team of trainers and covered such topics as: reflecting on culture, gender roles, women's work, "our bodies, ourselves," domestic violence, gender & HIV, "knowledge is power," and empowering change.

One study (Jewkes) evaluated the impact of the 50-hour Stepping Stones programme, whose aim is to improve sexual health by using participatory learning approaches to build knowledge, risk awareness, and communication skills and to stimulate critical reflection. Villages were randomised to receive either this or a three-hour intervention on HIV and safer sex. The program was delivered to single sex groups, in parallel, and had 13 three-hour long sessions that were complemented by three meetings of male and female peer groups and a final community meeting. The programme spanned about 50 hours and ran for six to eight weeks. The sessions covered how we act and what shapes our actions; sex and love; conception and contraception; taking risks and sexual problems; unwanted pregnancy; sexually transmitted diseases and HIV; safer sex and condoms; gender based violence; motivations for sexual behaviour; dealing with grief and loss; and communication skills. The sessions were mainly held on school premises after school hours.

The Ross study had four main components and sought to provide young people with the knowledge and skills to enable them to delay sexual debut, reduce sexual risk-taking by sexually active youth, and increase their appropriate use of sexual health services. The first was a participatory, teacher-led, peer-assisted, in-school programme, comprising an

average of 12 40-minute sessions per year, held in normal school hours in years 5–7 of primary school. The second component was the training of two to four health workers per government facility in the provision of youth friendly sexual and reproductive health services. The third and fourth components were a community-based condom promotion and distribution program by youth, and community wide activities that promoted community mobilization.

The Nigerian study (Fawole) was carried out in the two biggest motor parks in the capital cities of Ogun, Oyo and Osun States, and targeted all young female hawkers (YFH) working in the motor parks. The intervention included the development of IEC materials based on existing VAW posters and consultations with YFH. The training programme was implemented through 6 separate workshops, one for each motor park, and each running for a total of 3 days. Topics covered included: definition, types and consequences of VAW; HIV/AIDS including prevention and methods of transmission; results of the baseline survey; developing assertiveness skills; care and support for victims of violence; setting up small scale enterprises, and opportunities available to continue education. The microcredit facilities comprised a loan (\$20 each) that was given to professional and apprentice hawkers, while student hawkers received support for their education with a 10% per month repayment schedule.

The MAP study provided workshops to address male participants' values about gender, traditional gender roles, power dynamics that exist based on gender, gender stereotypes, and male and female perspectives on gender. Activities strived to increased men's awareness of the inequities that exist between women and men. Information on HIV/AIDS prevention, healthy relationships, sexual rights, sexual violence, and domestic violence was provided. The length and frequency of the workshops were not described.

Mass media campaign: One study (Usdin) evaluated the impact of a mass media campaign as a behaviour change intervention formulated to address domestic violence. The intervention consisted of prime time radio and television dramas and print material. It used edutainment, where social issues are integrated into entertainment formats. The

intervention aimed to impact at the individual, community and socio-political levels. The content was informed by formative research in the country. The programs and print materials were available nationwide.

Outcomes

Outcome measurements varied across studies. The only study to have an IPV-related outcome as the primary outcome was Pronyk. IPV measures were secondary outcomes in all other studies. Three studies calculated rate ratios (Pronyk, Jewkes, Ross) while the remaining three studies used proportions.

One study (Pronyk) calculated adjusted relative risks (RR) for an individual's experience of IPV in the last 12 months. Jewkes, on the other hand, calculated adjusted odd ratios (OR) for at least one perpetration of sexual or physical violence in the last 12 and 24 months for men, and adjusted OR for experience of sexual or physical violence in the last 12 and 24 months for women. The Tanzanian study (Ross) calculated adjusted RR for three 'correct' answers to three questions on sexual attitudes.

Three studies (MAP, Fawole, Usdin) calculated proportions (comparing baseline and endline) for various questions related to individuals' knowledge, attitudes, and practices related to IPV. These questions were measured on either a dichotomous or likert-type scale (Table 2.2 and 2.3).

Table 2.2. IPV-related outcomes of included randomized controlled trials

Study	Outcome(s)	Intervention arm frequency (%)		Control arm frequency (%)		Point estimate (95% CI)
		Pre-test	Post-test	Pre-test	Post-test	
Pronyk	Experience of intimate partner violence in the past 12 months	22/193 (11)	17/290 (6)	16/177 (9)	30/248 (12)	0.45^a (0.23, 0.91)
Ross	Attitudes to sex (% with all 3 answers 'correct' (men))	114/2607 (4.4)	454/2076 (21.9)	103/2496 (4.1)	247/2024 (12.2)	1.77^a (1.42, 2.22)
	Attitudes to sex (% with all 3 answers 'correct' (women))	261/2083 (12.5)	383/1448 (26.5)	238/2033 (11.7)	283/1492 (19.0)	1.42^a (1.11, 1.81)
Jewkes	Perpetration of IPV at 12 months (men)	100/694 (14.5)	61/534 (11.4)	96/666 (14.5)	75/505 (14.9)	0.73 ^b (0.50, 1.06)
	Perpetration of IPV at 24 months (men)		31/504 (6.2)		40/473 (8.5)	0.62 ^b (0.38, 1.01)
	Experience of IPV at 12 months (women)	177/715 (24.7)	103/559 (18.4)	157/701 (22.4)	114/550 (20.7)	0.87 ^b (0.64, 1.18)
	Experience of IPV at 24 months (women)		79/537 (14.7)		79/547 (13.5)	1.14 ^b (0.77, 1.68)

^a Adjusted relative risk

^b Adjusted odds ratio

Table 2.3. IPV-related outcomes of included quasi-experiments

Study	Outcome(s)	Frequency (%)	Frequency (%)
		Pre-test	Post-test
Fawole	% of YFH experiencing sexual harassment	30.4	15.7*
	% of YFH experiencing attempted rape	26.4	6.6*
	% of YFH experiencing forced sexual intercourse with partner or male friend	11.3	1.9*
	% of YFH experiencing rape	5.5	0.0
Usdin	Heard about the Helpline	36	41*
	I agree that violence is a serious problem	83	89*
	I disagree that violence between a man and a woman is a private affair	56	66*
	I agree no woman ever deserves to be beaten	77	88*
	I disagree that women who are abused are expected to put up with it	68	72*
	I disagree that in my culture it is acceptable for a man to beat his wife	85	84
	I disagree, as head of the household, a man has the right to beat a woman	87	89
	My community agrees that domestic violence is a serious problem	74	90*
	My community disagrees that violence between a man and a woman is a private affair	37	59*
	My family agrees that no woman ever deserves to be beaten	73	86*
	My family disagrees that women who are abused are expected to put up with it	55	66*
MAP	More rapes happen in RSA than anywhere else in the world (True)	79	86
	Rape is when a person is forced into having sex (True)	96	98
	Rape is the only form of sexual violence (False)	25	29
	A person can be raped by anyone, even people they know well (True)	96	96
	A prostitute can be raped (True)	89	92
	Men rape women because they need sex (False)	28	31
	If a man is aroused it is very difficult for him not to have sex (disagree or strongly disagree)	60	67
	It is ok for a woman to hit a man if he disobeys her (disagree or strongly disagree)	94	95
	It is ok for a man to hit a woman if she disobeys him (disagree or strongly disagree)	92	94
	Sometimes when a woman says no to sex she doesn't really mean it (disagree or strongly disagree)	43	59
	Women who dress sexy want to be raped (disagree or strongly disagree)	61	82
	It is a woman's job to take steps to prevent pregnancy (disagree or strongly disagree)	48	60
	Women ask to be hit and like to be abused (disagree or strongly disagree)	79	90
	Often when women say they have been raped, they are not telling the truth (disagree or strongly disagree)	44	58

* Statistically significant at $P < 0.05$

2.6.3 Excluded studies

One study (Kamali) was excluded after a full article review. Upon closer inspection it was confirmed that the study did not include any IPV-related outcomes.

2.7 Methodological quality of included studies

The overall methodological quality of the studies, according to the EPHPP tool, was evaluated as follows:

Strong – Pronyk, Jewkes, Ross

Moderate – Usdin

Weak – Fawole, MAP

The MAP and Fawole studies were ultimately excluded from the review's final analysis because of poor methodological quality. Appendix E provides the detailed results from the EPHPP.

2.7.1 Allocation

The absence of allocation concealment can lead to selection bias (44;45). One study (Pronyk) reported allocation concealment. The study pair matched villages by size and accessibility and then randomly allocated villages to either the intervention or the control group. Allocation concealment was achieved by blindly drawing one village name and assigning it to the intervention group. Women in the intervention villages who then participated in the microcredit programme were self-selected. Reasons for opting in or out of the programme were not reported and may have introduced self-selection bias. The remaining RCTs (Ross, Jewkes) did not report allocation concealment.

The MAP study provided very little information on recruitment, except to say that participants were recruited via the PPASA, which is the largest and oldest South African NGO in the field of sexual and reproductive health. Men associated with this

organization may already have more moderate views on IPV simply from their exposure to the PPASA. Self-selection bias may have also played a role, depending on how exactly participants were recruited.

Fawole et al invited all YFH in the selected motor parks to participate in the study. An explanation of why the specific motor parks were selected was not provided. Details on how participants were recruited and their reasons for participation or non-participation were not provided and could have biased treatment effects. Allocation concealment was not applicable since all YFH in the selected motor parks were targeted with the intervention.

In the case of the media campaign (Usdin), a multi-stage stratified national random sampling design was used to select populations to be sampled at baseline and endline. Samples were stratified by area (metropolitan, urban smaller towns, and rural areas) within each of the nine provinces. Enumeration areas were randomly selected within each province at baseline and again at the evaluation stage. The process for selecting households and respondents for interview was not clearly articulated in the article, and may have introduced selection bias. Allocation concealment was not applicable.

2.7.2 Blinding

Blinding was not applicable to three studies (Usdin, Fawole, MAP) because they did not include control arms. Two studies (Pronyk, Jewkes) reported blinding for their primary outcomes. The Jewkes study did not report blinding for the assessment of the secondary outcomes of sexual attitudes, which were the outcomes of interest for this review. The remaining RCT (Ross) did not report blinding.

2.7.3 Follow-up and exclusions

Three studies (Pronyk, Jewkes, Ross) gave detailed information on persons lost to follow-up. Pronyk reported for numbers of persons interviewed at baseline and end line, numbers of persons lost to follow-up, and explanations for losses to follow-up. Two-year follow-up rates for the intervention and comparison arms were 90% and 84%,

respectively. Ross reported 73% of eligible cohort members were seen at the final survey. Intervention and control arms had similar follow-up rates (72% and 74%, respectively), but were higher among male participants and younger participants. Jewkes reported no clusters lost to follow-up. At 24 months, 73.1% (intervention) and 76.0% (control) of women with baseline data were retested and 69.5% (intervention) and 69.2% (control) of men were tested again. Loss to follow-up was mainly because participants had moved and could not be located.

No analyses were conducted on differences between participants lost to follow-up and those that completed the three studies. There was a risk of attrition bias if substantial differences existed between the two groups, though mitigated by the low rates of follow-up loss. Schulz and Grimes purport that losses to follow-up of between 5% and 20% may be a source of bias, while beyond 20% is considered a serious threat to internal validity (46;47).

Another study (MAP) reported difficulties in following up participants 3 months after the training because participants, young and largely unemployed men, were transient by nature. Ten percent of participants did not complete the training. A final total of 80% (81/101) completed the training and the 3-month post interview. No analysis was provided comparing participants who completed the study to those lost to follow-up.

No reporting was provided on persons lost to follow-up in the Nigerian study (Fawole). It was reported at baseline that 345 hawkers were interviewed while 374 were seen at endline. Comparison of the characteristics of baseline and endline respondents showed that the two groups were composed of different respondents.

The final study (Usdin) used a one-group pretest/posttest-only design with different population samples at the baseline and evaluation time points, thus follow-up considerations were not applicable.

2.7.4 Selective reporting

There were no indications of selective reporting by the included studies, beyond the limited reporting on losses to follow-up in applicable cases. Four studies (Usdin, Pronyk, Jewkes, Ross) clearly identified time points and analyses.

2.7.5 Other potential sources of bias

All studies had a risk of history bias. South Africa has some of the highest HIV and domestic violence rates in the world and campaigns against the two threats have been commonplace in the country since the nineties (48-52). It was possible that study participants from the three South Africa studies (Usdin, Pronyk, MAP) were exposed to other IPV prevention campaigns, and changes in their views on IPV could have been affected by one of these other interventions. It was more difficult to determine the extent of history bias in the Nigerian study (Fawole) because action against IPV and HIV in Nigeria is not as developed as in South Africa.

No studies presented information on the validity of the instruments that were used to measure IPV outcomes, introducing a risk of measurement bias.

One study's authors (Pronyk) cited possible biases for their study, including: biased reporting due to participants in the intervention arm being more sensitized to IPV issues, and cross-contamination between the intervention and control arms due to the close proximity of the villages (53). Jewkes cited possible sources of bias as social desirability of responses and differential reporting bias. Ross also cited differential reporting bias as a possibility.

2.8 Results

The objective of this systematic review was to examine and summarize the effects of public health interventions to reduce IPV between women and men in developing countries. The eligibility criteria for the studies were left sufficiently open to allow for a broad range of interventions to be identified. The included studies varied in design (RCT

vs. quasi-experimental), intervention type (media campaign, training program, microcredit), and targeted population (general population vs. targeted), but all sought to either reduce IPV incidence or positively affect individuals' knowledge, attitudes and/or practices related to IPV through a public health intervention.

Three randomized controlled trials were identified (Pronyk, Jewkes, Ross). In addition, three quasi-experimental studies (Usdin, Fawole, MAP) were also identified.

Five of the six studies used training workshops to affect changes in people's views on IPV (Pronyk, Fawole, MAP, Jewkes, Ross), with two studies including a microcredit component (Pronyk, Fawole). The remaining study (Usdin) evaluated the impact of a national media campaign. Given the heterogeneity in study designs, interventions, and measured outcomes, a meta-analysis was not conducted.

While six studies were initially identified for inclusion in the review, the application of the EPHPP tool to assess methodological quality identified two of the quasi-experimental studies (MAP and Fawole) as having inferior study design, and they were subsequently eliminated from the interpretation of results. The MAP study was excluded because the reporting offered little to no information on participant selection, losses to follow-up, or details on the intervention, providing ample room for bias. In addition, the statistical analyses provided were rudimentary (simple proportions comparing baseline and endline results) with no tests for significance. Problems with the Fawole study included no reporting on losses to follow-up, no information on controlling for confounders, and a strong likelihood of selection and allocation bias.

In examining the results of the remaining four studies, it was found that both strategies (training and mass media campaigns) had a positive impact on IPV rates and/or KAP.

2.8.1 Training

The Pronyk study implemented a program that integrated a training component to affect individuals' knowledge, attitudes and practices related to IPV with a microcredit

component to target structural challenges to positive behaviour change. The study found a decreased adjusted relative risk (AdjRR = 0.45; CI: 0.23 – 0.91) for experience of IPV in the past 12 months for participants in the interventions arm compared with the control arm.

Ross found a significant improvement in sexual attitudes related to IPV in both men (adj RR=1.77 CI: 1.42, 2.22) and women (adj RR=1.42 CI: 1.11, 1.81) at the end of the intervention. Jewkes results for incidence of IPV in the last 12 or 24 months were not statistically significant (Table 2.2).

2.8.2 Mass media campaigns

The Usdin study examined the impact of a mass media campaign on individuals' knowledge, attitudes and practices related to IPV, and reported significant positive shifts in a number of areas (Table 2.3). For example, 89% of respondents at endline agreed that violence is a serious problem, compared to 83% at baseline ($p \leq 0.05$). Eighty-eight percent agreed at endline that no woman should even be beaten, compared to 77% at baseline ($p \leq 0.05$), and 72% disagreed at endline that women who are abused are expected to put up with it compared to 68% at baseline ($p \leq 0.05$).

2.9 Discussion

This review identified four behavioural interventions to reduce or prevent IPV in a developing country setting of sufficient methodological quality to be included in a systematic review. Three of the studies (Pronyk, Ross, Usdin) were found to either significantly reduce IPV incidence (Pronyk) or have a significant and positive impact on participants' knowledge, attitudes or behaviours pertaining to IPV (Ross, Usdin). The Jewkes study did not have a statistically significant impact on IPV incidence.

Three of the studies were RCTs (Jewkes, Pronyk, Ross) that used training programs to affect behaviour change, and the fourth study (Usdin) evaluated the impact of a mass media campaign using a quasi-experimental design. The IPV outcomes varied by study

(relative risks, odds ratios, and proportions) and did not permit the execution of a meta-analysis. Furthermore, two studies had IPV-related variables as secondary outcomes only (Ross, Jewkes).

The incorporation of a structural component (microcredit) in the Pronyk study raises the question of whether the behavioural component (the training) or the microcredit scheme are what resulted in a reduced risk of IPV for study participants. The Global Coalition on Women and AIDS cited microcredit interventions for the economic empowerment of women as a promising prevention strategy (28). The work of Sweat at Johns Hopkins University's Bloomberg School of Public Health showed that most intervention programs are in fact made up of multiple intervention components, and that the blending of these components is a way to maximize program success (54). However, strategies for evaluating such programs that can tease out the different contributions of the various components are still needed and will help to identify the most effective combinations of prevention strategies.

The results of this review were similar to those of the other behavioural intervention reviews for both IPV and HIV prevention that were summarized in Chapter 1. Previous research has shown that mass media interventions can increase awareness, and are a recommended HIV prevention method for widespread implementation (13;30). This review also found mass media interventions to be effective at changing attitudes, but similar to the findings of Morrison, their impact on violence levels remains unclear in the Usdin study.

The systematic reviews that were part of the WHO Technical Report Series noted that adult-led school-based interventions were one of the strategies that had the most satisfactory evidence base (30), and the Ross study also employed this approach (teacher-led, peer-assisted education sessions). The findings of Ross et al confirmed the effectiveness of this approach, and were also aligned with the findings of Kirby et al that showed school-based interventions to have a positive impact on risky sexual behaviour by youth (31).

However, the findings of Gallant et al indicated the need to target behaviour change interventions at primary or lower-secondary pupils to have a greater impact on behaviour change (55). This is also supported by Morrison. Yet in examining the age groups of the studies reviewed in this chapter, the youngest age of study participants was around 15 years (Ross, Jewkes), with the majority of participants being much older. This characteristic alone may have limited the impact of the interventions on sustained behaviour change.

The need to target the attitudes and behaviours of young men, in particular, when it comes to IPV prevention is acknowledged (13;28). One could argue that a limitation of the Pronyk study was the sole targeting of women with the intervention, and that a greater impact on behaviour change could have been achieved if a component was included to affect and measure the attitudes and behaviours of men in the intervention communities.

The difference between statistically significant and clinically relevant results needs to be taken into consideration when examining study results. The large sample size of Usdin provided statistically significant results for some items that may not be clinically relevant. For example, a shift from 36 to 41 percent of respondents who had heard of the helpline in Usdin is not necessarily clinically relevant, as compared to the decrease in respondents reporting experience of rape from 5.5 to 0 percent in Fawole – a study with a much smaller sample size.

The inclusion of observational and/or quasi-experimental designs in systematic reviews continues to be debated. While some studies show observational studies to produce inflated (biased) results compared to RCTs, others argue the opposite (56). Concato cited research that indicated that the study design (i.e. RCT vs. observational) was not as important in determining differences in results as using similar criteria for study participants and suitable methodological precautions. While RCTs can present valuable information on the internal validity and efficacy of an intervention, well-implemented quasi-experimental designs can build our knowledge of intervention effectiveness (57).

Both study designs add value and should be used in a complementary manner that recognizes their respective benefits and drawbacks.

The quasi-experimental studies identified by this review ranged in quality, with one study (Usdin) demonstrating sufficient methodological rigour through the use of random sampling. Ways in which the study design could have been further improved include using a double pretest, or by adding a non-equivalent dependent variable where the non-equivalent variable is not expected to change but will respond to internal validity threats in the same way as the main dependent variable of interest (43).

Study inclusion criteria were left sufficiently broad to capture any relevant study regardless of methodological rigour. Any study that included an IPV intervention in a developing country was initially screened into the review. The intention was to undertake a transparent and reproducible review.

A limitation of this review was the inclusion of only one author who solely reviewed eligible studies, collected data, evaluated methodological quality, and interpreted results. The small number of studies likely limited the bias that may have been introduced in the review and data collection stages, and discussions between the author and her thesis advisors helped to inform the evaluations of methodological quality and results interpretation.

The inclusion of English-only publications may have also played a role in biasing the reviews results, but the extent of the impact is hard to discern. Contacting experts in the field helped to identify any unpublished works (e.g. MAP), which likely cut down the risk of publication bias.

More research is needed to identify effective behavioural interventions for the prevention or reduction of intimate partner violence in developing countries. Both RCTs and quasi-experimental designs have information to offer and should be applied with methodological rigour. In the case of quasi-experiments, more effort needs to be placed

on improving study design, including the use of a double pretest or by adding non-equivalent dependent variables. Consistency in outcome measures is also required.

3.0 Measuring intimate partner violence knowledge, attitudes and practices

3.1 Introduction

Gender inequalities and violence against women are drivers of the HIV/AIDS epidemic in southern Africa. Evidence of this theory was reported in Chapter one. Women are directly and indirectly placed at greater risk of HIV infection due to violence, and they are most likely to experience violence from an intimate partner. The prevention and reduction of IPV is seen as a necessary measure for the primary prevention of HIV/AIDS.

As more and more evidence emerges to support this theory, increasing efforts are being made to combine IPV and HIV prevention programming. Chapter two demonstrated that IPV prevention efforts in Africa are largely linked to HIV prevention campaigns, though their number are few. The systematic review identified five IPV prevention interventions in developing countries, and all five were combined with HIV prevention programs. In addition, Garcia-Moreno and Watts cited a number of initiatives that are also underway to link IPV and HIV prevention, including (41):

- Public meetings in Zimbabwe to highlight the links between HIV infection and violence against women, and to explore their implications for HIV/AIDS prevention;
- Proposals for the development of guidelines on partner notification, in order to reduce the risk of domestic violence to women testing HIV-positive in the United States;
- An advocacy campaign to encourage expenditure on developing methods of HIV protection that women can use without requiring their partner's consent.

3.1.1 The Soul City Regional Evaluation (SR1)

In 2002-2003, CIET undertook the Soul City Regional Evaluation, Phase 1 (SR1). The study was a cross-sectional household survey in eight southern African countries (Zimbabwe, Zambia, Malawi, Mozambique, Botswana, Namibia, Lesotho, Swaziland) to

measure the impact of education-entertainment messages on HIV prevention (58). The data were stratified using the most recent census results into rural, urban (not capital), and urban capital sites. Last stage random selection of enumeration areas was proportional to the national population. Interviewers covered all households in an enumeration area without sub-sampling. All residents between the ages of 16 and 60 years who were present at the time of the survey were interviewed in each household (58). Respondents were asked approximately 100 questions on a multitude of subjects related to HIV prevention, intimate partner violence, and their socio-demographic characteristics. A copy of the questionnaire code sheet can be found in Appendix F.

Of the 17,377 households in 213 randomly selected enumeration areas, 20,639 adults participated from 16,707 households (96% initial acceptance) where 85,114 people lived. 58% (n=11,872) were female; 63% (n=13,017) were rural residents, 22.1% (n=4,563) urban and 14.8% (n=3,059) lived in the capital/metro area (58).

The SR1 study included a series of 17 questions that solicited a respondent's views on intimate partner violence. Respondents were asked if they agreed or disagreed with a series of statements related to IPV based on a likert-type scale (1=strongly agree, 2=agree, 3=no opinion, 4=disagree, 5=strongly disagree, 7=don't know, 9=missing). The responses were converted to a dichotomous variable by CIET (0=healthy, 1=unhealthy). A response was labelled "healthy" if it rejected a statement that promoted violence.

The questions were developed to reflect different stages of the CASCADA model described in Chapter one. The model presents broad stages towards behaviour change: **C**onscious knowledge, **A**ttitudes, **S**ubjective norms (i.e. a person's perception that most people who are important to him or her think he or she should or should not perform a behaviour), **i**ntention to **C**hange, **A**gency (i.e. a person's ability to take action or exert power), **D**iscussion or ability to talk about it, and **A**ctions/practices/behaviours. How one individual will progress through the cascade towards action/behaviour change will vary from another person, and the steps are not all necessary or linear. The 17 IPV items in the SR1 study can be categorized as follows on the cascade:

**Table 3.1 Frequencies of 17 IPV-related questionnaire items in the Soul City
Regional Evaluation study**

Step in CASCADA	Variable name	IPV item	Frequency (%)		
			Healthy	Unhealthy	Missing
Attitude	<i>Gift</i>	Men have the right to have sex with their girlfriends if they buy them gifts.	11943 (71.5)	4518 (27.0)	246 (1.5)
	<i>Love</i>	A person has to have sex with their boyfriend or girlfriend to show they love them.	9836 (58.9)	6652 (39.8)	219 (1.3)
	<i>Fault</i>	If a woman gets raped it is her own fault.	12747 (76.3)	3701 (22.2)	259 (1.6)
	<i>Older</i>	It's okay for an older man to have sex with teenagers.	14826 (88.7)	1689 (10.1)	192 (1.1)
	<i>Know</i>	Forcing sex with someone you know is not rape.	12490 (74.8)	3988 (23.9)	229 (1.4)
	<i>Private</i>	Violence between a man and a woman is a private matter in which others shouldn't interfere.	7864 (47.1)	8571 (51.3)	272 (1.6)
	<i>Beat</i>	Women sometimes deserve to be beaten.	10506 (62.9)	5947 (35.6)	254 (1.5)
	<i>Refuse</i>	Women have the right to refuse to have sex with their partners.	9014 (54.0)	7330 (43.9)	363 (2.2)
	<i>Expect</i>	It's okay for a man to expect sex without a condom.	11050 (66.1)	5328 (31.9)	329 (2.0)
	<i>Rape</i>	Forcing your partner to have sex is rape.	10738 (64.3)	5770 (34.5)	199 (1.2)
	<i>Accept</i>	In my culture it is acceptable for a man to beat his wife.	11979 (71.7)	4418 (26.4)	310 (1.9)
Subjective norms	<i>Right</i>	Do most of your friends feel men have the right to have sex with their girlfriends if they buy them gifts?	8573 (51.3)	6976 (41.8)	1158 (6.9)
	<i>Commrefuse</i>	Do most people in your community feel women have the right to refuse to have sex with their partners?	7806 (46.7)	7690 (46.0)	1211 (7.2)
	<i>Condom</i>	Do most people in your community feel it is okay for a man to expect sex without a condom?	9161 (54.8)	6247 (37.4)	1299 (7.8)
	<i>Serious</i>	Is violence against women considered a serious problem in your community?	10263 (61.4)	5572 (33.4)	872 (5.2)
	<i>Do</i>	Can your community do anything about violence against women?	8467 (50.7)	6519 (39.0)	1721 (10.3)
Discussion	<i>Violence</i>	In the last year, how often did you talk with anyone about domestic violence?	9711 (58.1)	6615 (39.6)	381 (2.3)

The objectives of Chapter 3 were:

1. To identify the relationships and underlying constructs (factors) among the 17 IPV items using exploratory factor analysis methods. (Factor analysis analyzes the interrelationships between variables and explains them in terms of common, underlying dimensions or factors);
2. To interpret the underlying constructs (factors) in order to facilitate analyses to be conducted in Chapter 4 investigating the relationship between individuals' views on IPV and their HIV knowledge sources.

3.2 Methods

The EFA was conducted using Mplus 5.0. Mplus allows statistical modelling with latent variables and offers a wide range of models, estimators, and algorithms. It permits analysis of cross-sectional and longitudinal data with continuous, censored, binary, ordinal, nominal, count variables, or a combination thereof. It also offers special features for analyzing complex survey data (59), which is further explained below.

3.2.1 Exploratory factor analysis

Exploratory factor analysis (EFA) was applied to the 17 IPV items. EFA is a technique that attempts to determine the minimum number of continuous latent variables or factors that can adequately describe the correlations among a set of observed variables. The model is exploratory in the sense that it does not impose a structure on the relationship between the observed variables and the continuous latent variables but only specifies the number of continuous latent variables. The goal of exploratory factor analysis is to find the smallest number of interpretable factors that can adequately explain the correlations among a set of variables. It is the most common form of factor analysis and is primarily used for the purpose of data reduction. Factor loadings are used to determine the factor structure of the data (60;61).

EFA is a type of common factor analysis because it does not extract all of the variance, but only the proportion of the variance that is common to several items. EFA assumes

linear relationships, interval or near interval data, moderate-high intercorrelations (> 0.30) without multicollinearity, valid imputation of factor labels, and proper specification of factor indicators (60;61). The use of tetrachoric correlations in exploratory factor analysis of dichotomous data makes the assumptions of interval data and linear relationships possible. Tetrachoric correlations are used to estimate the correlation between two binary items if the items were measured on a continuous scale (62).

The proportion of variance for a particular item that is due to common factors is called the item's communality. Its value can range between 0 and 1. If a communality equals 1, the situation is referred to as a Heywood case, and if a communality exceeds 1, it is an ultra-Heywood case (61). A Heywood or ultra-Heywood case implies that a factor has a negative variance, indicating that there is something wrong with the model. Possible causes include: bad prior communality estimates, too many common factors, too few common factors, not enough data to provide stable estimates, and the common factor model is not an appropriate model for the data (63).

Factor loadings are the correlation coefficients between the variables and factors (61). The square of the factor loadings is the percentage of the variance in the variable that is explained by that factor. Factor loading minimum cut-offs are somewhat arbitrary, but a minimum of 0.30 or 0.35 is generally accepted (60). It is important to also examine how an item contributes to the interpretability of a given factor and if it loads onto more than one factor, bringing into question its appropriateness for the model (60). For this analysis, factor loadings > 0.40 were considered strong and were the primary source of information used to interpret and label extracted factors.

3.2.2 EFA in Mplus

EFAs in Mplus can be estimated using complex, multilevel survey data. A simple factor analysis was not appropriate given the complexity of the data, thus the need to employ a special software package, such as Mplus. Observed data can be continuous, censored, binary, ordered categorical, counts, or combinations of these types. Mplus uses tetrachoric correlations with binary outcomes in an EFA (59).

The method of extraction used was the weighted least squares estimator (WLSMV) that provides weighted least squares parameter estimates using a diagonal weight matrix with standard errors and mean- and variance-adjusted chi-square test statistics using a full weight matrix (59). Muthén found that the weighted least squares approach was a practical method for latent variable analysis with large models and categorical outcomes (64), which is the case here. The factors were rotated using the Varimax orthogonal rotation. A varimax rotation is an orthogonal rotation criterion that maximizes the variance of the squared elements in the columns of a factor matrix. It is the most common form of orthogonal rotation (65). Rotating factors separates them out more clearly for interpretation. The Varimax rotation is often used in surveys to see how groupings of questions (items) measure the same concept. No *a priori* assumptions were made about the relationships between the variables in this analysis except that they were all related to a person's views on IPV.

The evaluation of model fit was determined using the chi-square test of model fit ($p < 0.05$) and one alternative fit index, the Root Mean Square Error of Approximation (RMSEA). The chi-square test alone is not enough to determine model fit, as it is sensitive to the distribution of the data and sample size. A large sample can result in the rejection of a model based on only small differences between the model and sample covariance or correlation matrix resulting in a Type II error (66). The RMSEA is an alternative fit index that accounts for model complexity or the degrees of freedom in the model (67). Its values can range from 0 to infinity. Brown and Cudeck recommended that an RMSEA value of 0.05 or less indicates a close fit and up to 0.08 indicates reasonable fit (68). Yu concluded that an $\text{RMSEA} \leq 0.05$ can be an indication of a good model with binary outcomes with $N \geq 250$ (69).

The number of factors to be retained was identified by applying the following criteria: eigenvalue > 1.0 , chi-square test of model fit ($p \leq 0.05$), $\text{RMSEA} < 0.05$, checking for negative residual variances, and examining the pattern of factor loadings and their

interpretability (60;70). An eigenvalue is the variance in a set of variables explained by a factor. It is the sum of the squared values in the column of a factor matrix (65).

3.2.3 Complex survey design

Before the exploratory factor analysis could be undertaken, the complex survey design of SR1 had to be addressed. The survey design resulted in clustering at the household and enumeration area levels. Individuals were clustered within households, and households within enumeration areas. As a result, the SR1 data had three levels – individual, household, and enumeration area. Consequences of not taking clustering into account include violations of the assumption of independence between observations, artificially inflated sample sizes, lower p-values, and narrower confidence intervals (71;72).

Complex survey data analysis in Mplus can be done by computing standard errors and a chi-square test of model fit taking into account stratification, non-independence of observations due to clustering, and/or unequal probability of selection. With sampling weights, parameters are estimated by maximizing a weighted loglikelihood function. Standard error computations use a sandwich estimator. Observed outcome variables can be continuous, censored, binary, ordered categorical (ordinal), unordered categorical (nominal), counts, or combinations of these variable types (73;74). Subsequently, for this analysis a weight variable was included for the unequal probability of selection by country (selection was proportional to the national population), and enumeration area type (urban, rural, capital) was identified as the stratification variable in the model.

The last challenge was to address the three levels of data. Given that Mplus 5.0 only permits the identification of two levels (i.e. one cluster variable), one level of data was removed. This was accomplished by selecting the first respondent per household, resulting in a reduced sample size from 20,639 to 16,707, or a reduction of 19.1%. A sensitivity analysis was conducted to determine if there were systematic differences between first household respondents and the remaining household members. Identifying the enumeration area variable as the cluster variable in the model then controlled for the remaining level of clustering.

3.2.4 Missing data

Preliminary descriptive statistics showed 24% of data were missing for the 17 IPV items when variables missing at least one observation were deleted. Missing data are a common occurrence in observational studies of this nature (i.e. large scale, population-based, in a developing country). Although study designs attempt to limit or control missingness, certain aspects are beyond the control of the investigator (e.g. study drop-outs, intentional or unintentional questionnaire item non-response, etc.), and therefore need to be addressed through statistical analysis.

In order to address this challenge with the SR1 dataset, the type of missingness had to first be identified and then a strategy for dealing with missing data had to be selected.

3.2.5 Types of missing data

Missing data are generally categorized as one of the following: 1) Missing completely at random (MCAR); 2) Missing at random (MAR); or 3) Missing not at random (MNAR) (75). Data are considered MCAR if the probability that an observation, x_i , is missing is unrelated to the value of x_i or to the value of another variable in the data set. Data are missing at random (MAR) if the probability that x_i is missing is unrelated to the value of x_i after controlling for another variable. All other cases of missing data are defined as MNAR and the missingness is considered non-ignorable. In such cases, the only way to obtain an unbiased estimate of parameters is to model the missingness (75).

3.2.6 Determining the type of missingness

An examination of missing data patterns can reveal some information on the distribution of missing data, and consequently, the type of missingness present. Schafer and Graham wrote: “For any dataset, one can define indicator variables R that identify what is known and what is missing. We refer to R as the missingness... We treat R as a set of random variables having a joint probability distribution. We may not have to specify a particular distribution for R , but we must agree that it has a distribution... The distribution of R is best regarded as a mathematical device to describe the rates and patterns of missing

values and to capture roughly possible relationships between the missingness and the values of the missing items themselves.” (76)

Curry and Kim made some general observations on the data patterns that would be seen depending on the type of missingness. In the case of MCAR, the missing data pattern would exhibit randomness. For MAR, the data pattern would be systematic. However, in the case of MNAR, an examination of missing data patterns may not reveal any useful information on the missing data distribution (77).

To test for MCAR, one can compare the proportion of cases with missing data on certain variables to determine if they differ from respondents. Any such difference would be a violation of MCAR (78). Testing for MAR is not possible (78). Ultimately, when missingness is beyond the researcher’s control and its distribution is unknown, MAR is only an assumption that cannot be tested. Yet, in most cases, departures from MAR may not be significant enough to invalidate results (76).

Testing for MCAR was carried out by comparing respondents and non-respondents to the 17 IPV items on six variables – sex, age, primary education, history of IPV, income, and current partner status. Phi coefficients were calculated in SAS 9.1.3 using the PROC FREQ /CHISQ test to measure the strength of the associations. The phi coefficient is a measure of the degree of association between two binary variables. Its value ranges from 0 to 1. A value closer to zero indicates a weaker association. This measure is similar to the correlation coefficient in its interpretation.

3.2.7 Methods for dealing with missing data

Some of the more popular methods for dealing with missing data include: listwise deletion, pairwise deletion, maximum likelihood estimation, and multiple imputation.

Listwise deletion entails the exclusion from analysis of all cases that are missing at least one variable value. It is the default for most statistical software packages. While it offers some attractive statistical properties, listwise deletion has its disadvantages – most

notably the reduction of the original sample size. A loss of more than 10% of the original sample size through listwise deletion is generally considered unacceptable. Listwise deletion is considered an acceptable strategy for data that are MCAR or MAR, provided that less than 10% of the sample is deleted (75).

Pairwise deletion, or available case analysis, involves dropping from the analysis only cases that have missing values on any two variables being analyzed at any given point. Pairwise deletion is considered a viable option if the number of missing cases on each variable is small relative to the total sample size, the pattern of missing values is random, and the number of variables involved is large (77). Generally the greatest limitation of the pairwise method is that the estimated standard errors and test statistics produced by conventional software are biased because of problems determining an accurate sample size for the calculations. This method typically preserves more data than complete case analysis.

According to Allison, maximum likelihood estimation (ML) is known to be consistent, asymptotically efficient and asymptotically normal when the missing data mechanism is ignorable (MCAR or MAR) (79). Advantages of this method are that it is easy to use and many different software packages apply it. A disadvantage is that standard errors and test statistics reported in linear modeling software will be incorrect (75).

In multiple imputation imputed values are generated using existing data, but random variation is deliberately introduced into the imputation process. The MI procedure replaces missing values with sets of plausible values that represent the uncertainty about the correct value of the impute. The imputed data sets are then analyzed using standard procedures in conventional software for complete data and the results are combined (80). MI assumes that data are missing at random (MAR). It can produce estimates that are consistent, asymptotically efficient and asymptotically normal when the data are MAR (75). It can also be used with any kind of data and any kind of model (75). However, MI is computationally complex. According to Schafer and Graham, “The validity of MI rests on how the imputations are created and how that procedure relates to the model used to

subsequently analyze the data. Creating MIs often requires special algorithms” (76). The MAR assumption becomes more plausible as more variables are included in the imputation model. It is advisable to include as many relevant covariates as the model allows, including variables present in the analysis model, variables associated with missingness of the imputed variable, and variables correlated with the imputed variable (81).

Curry and Kim argued that when the sample size is very large ($n > 1,000$), the choice of method to deal with missing data may not make much of a difference (77).

For the purposes of this analysis, multiple imputation techniques were applied. Ten imputed datasets for the SR1 study were created by CIET using the Amelia II software. Amelia II allows users to appropriately impute (“fill in” or rectangularize) incomplete data sets so that analyses which require complete observations can use all the information present in a dataset with missingness, and avoid the biases and inefficiencies that can result from dropping all partially observed observations from the analysis. It is designed specifically for use in the social sciences (82). CIET used Amelia II to impute for missing data using an Expectation Maximization (EM) algorithm for all variables included in the general estimating equation (GEE) model. Estimates reconciled data from the ten imputed data sets using Rubin’s approach in the software program, Zelig (82-84).

3.2.8 Multiple imputation in Mplus

Multiple imputation analysis is available in Mplus, but the imputed datasets must be created outside of the statistical software package. When imputation is specified, an analysis is carried out for each data set. Parameter estimates are averaged over the set of the analyses, and standard errors are computed using the average of the standard errors over the set of analyses and between analysis parameter estimate variation (59).

3.3 Results

An examination of the correlation matrix showed that the variables had low to medium correlations with no multicollinearity (See Appendix G).

3.3.1 Missing data

An examination of missing data patterns using Mplus revealed 302 patterns for the 17 IPV variables (see Appendix H). 12,640 observations (76%) were not missing any values for the 17 IPV variables. A further 2,503 observations (15%) were missing values on only one IPV variable. 98 observations (0.06%) were missing values on all variables. The data patterns themselves were neither systematic nor random, but appeared to have aspects of both.

The MCAR test was applied to compare respondents and non-respondents on selected covariates. The phi coefficients are presented in Table 3.2. Values greater than 0.50 are bolded. Overall, the associations appeared weak. There were very weak associations between the IPV items and age, sex, and income. Phi coefficient values were slightly higher for current partner status, primary education, and history of IPV. In particular, there were moderately strong associations between the IPV item, *Violence*, and both current partner status and primary education, indicating that a person's response to the question "In the last year, how often did you talk with anyone about domestic violence?" was related to whether or not they had a current partner or had completed their primary education.

Table 3.2. Phi coefficients

Variable	Age	Sex	Income	Current partner	Primary education	History of IPV
<i>Gift</i>	0.11	0.11	0.04	0.27	0.26	0.19
<i>Older</i>	0.10	0.11	0.02	0.31	0.31	0.22
<i>Refuse</i>	0.07	0.07	0.03	0.24	0.23	0.18
<i>Expect</i>	0.06	0.06	0.03	0.22	0.22	0.16
<i>Love</i>	0.10	0.11	0.03	0.35	0.36	0.26
<i>Fault</i>	0.09	0.09	0.03	0.34	0.36	0.25
<i>Know</i>	0.09	0.09	0.02	0.37	0.36	0.27
<i>Rape</i>	0.09	0.10	0.03	0.40	0.39	0.29
<i>Private</i>	0.07	0.08	0.02	0.37	0.36	0.27
<i>Beat</i>	0.08	0.09	0.02	0.40	0.39	0.29
<i>Accept</i>	0.08	0.09	0.02	0.37	0.35	0.26
<i>Right</i>	0.07	0.09	0.03	0.24	0.28	0.19
<i>Commrefuse</i>	0.05	0.05	0.05	0.23	0.23	0.19
<i>Condom</i>	0.06	0.05	0.04	0.23	0.23	0.20
<i>Serious</i>	0.05	0.05	0.03	0.40	0.40	0.30
<i>Do</i>	0.03	0.04	0.07	0.29	0.28	0.21
<i>Viol</i>	0.09	0.08	0.02	0.64	0.65	0.49

Given the results of the MCAR test and the inability to test for MAR, we proceeded with our analysis on the assumption that data were, at worst, missing at random.

3.3.2 EFA findings

Six factors were identified using the eigenvalue value cut-off of 1.0. The factor loadings for each variable are listed in Table 3.3. Two instances of factor loadings > 1.0 indicated that an ultra-heywood case was present and the model was overfit (*Commrefuse* on F3 and *Rape* on F5). An examination of the residual variances (see Appendix H) also showed two negative values, confirming that too many factors were extracted with the 6-factor solution.

Table 3.3. Factor loadings for 6-factor solution

Variable	F1	F2	F3	F4	F5	F6
<i>Gift</i>	0.944	0.082	0.008	0.049	0.252	0.025
<i>Older</i>	0.296	0.255	-0.118	0.180	0.211	0.001
<i>Refuse</i>	0.003	-0.026	0.664	-0.112	0.074	0.013
<i>Expect</i>	0.135	0.057	-0.018	0.550	0.238	0.045
<i>Love</i>	0.439	0.077	0.099	0.251	0.421	0.022
<i>Fault</i>	0.165	0.102	-0.043	0.102	0.601	0.023
<i>Know</i>	0.161	0.070	0.043	0.053	0.308	-0.024
<i>Rape</i>	0.041	-0.005	0.316	0.072	0.068	0.063
<i>Private</i>	0.097	0.063	0.104	0.059	0.424	0.042
<i>Beat</i>	0.134	0.500	0.072	0.000	0.417	0.052
<i>Accept</i>	0.098	1.024	-0.038	0.076	0.120	0.033
<i>Right</i>	0.453	0.063	-0.047	0.191	0.174	0.007
<i>Commrefuse</i>	-0.075	0.014	0.442	0.040	-0.027	0.065
<i>Condom</i>	0.118	0.021	0.072	0.590	0.016	0.008
<i>Serious</i>	0.016	0.042	0.064	0.040	-0.254	0.748
<i>Do</i>	0.000	-0.008	0.127	-0.005	0.051	0.752
<i>Violence</i>	-0.011	-0.023	-0.035	-0.022	-0.185	-0.383

In examining the 5-factor model (Table 3.4), there were no factor loadings > 1.0 and no negative residual variances (see Appendix H). In addition, the chi-square test of model fit ($p < 0.001$) and RMSEA (RMSEA=0.021) values both indicated a good model fit. The 5-factor solution was the final model selected for interpretation. Factor loadings > 0.40 are bolded.

Table 3.4. Factors loadings for 5-factor solution

Variable	F1	F2	F3	F4	F5
<i>Gift</i>	0.804	0.046	-0.065	0.085	0.076
<i>Older</i>	0.367	0.264	-0.147	0.166	0.017
<i>Refuse</i>	0.034	-0.016	0.636	-0.100	0.022
<i>Expect</i>	0.283	0.099	0.007	0.483	0.036
<i>Love</i>	0.640	0.106	0.117	0.200	0.023
<i>Fault</i>	0.495	0.220	0.028	0.051	-0.001
<i>Know</i>	0.335	0.105	0.069	0.016	-0.032
<i>Rape</i>	0.086	-0.006	0.320	0.058	0.067
<i>Private</i>	0.306	0.197	0.156	0.038	0.022
<i>Beat</i>	0.295	0.781	0.095	-0.024	0.038
<i>Accept</i>	0.169	0.673	-0.080	0.093	0.061
<i>Right</i>	0.498	0.029	-0.090	0.170	0.032
<i>Commrefuse</i>	-0.085	0.015	0.442	0.057	0.069
<i>Condom</i>	0.120	0.007	0.062	0.639	0.012
<i>Serious</i>	-0.137	-0.027	0.017	0.052	0.740
<i>Do</i>	0.019	0.008	0.139	-0.007	0.757
<i>Violence</i>	-0.117	-0.079	-0.061	-0.008	-0.366

Table 3.5. Factor 1: Reciprocity

Variable	Questionnaire item	Factor loading
<i>Gift</i>	Men have the right to have sex with their girlfriends if they buy them gifts.	0.804
<i>Love</i>	A person has to have sex with their boyfriend or girlfriend to show they love them.	0.640
<i>Right</i>	Do most of your friends feel men have the right to have sex with their girlfriends if they buy them gifts?	0.498
<i>Fault</i>	If a woman gets raped it is her own fault.	0.495

The interpretation of the first factor was *Reciprocity*. It was dominated by the questionnaire items *Gift* and *Love* with factor loadings greater than 0.50 (0.804 and 0.640, respectively). They were followed closely by *Right* (0.498) and *Fault* (0.495). *Gift* and *Right* were the same question, with *Right* framed differently to capture subjective norms. All items inferred that one action required a response of equal nature. For example, the giving of a gift requires reciprocation with the gift of sex. Alternatively, in the case of the variable, *Fault*, rape is a negative consequence in response to behaviour that is also deemed to be unwanted.

Table 3.6. Factor 2: Physical violence

Variable	Questionnaire item	Factor loading
<i>Beat</i>	Women sometimes deserve to be beaten.	0.781
<i>Accept</i>	In my culture it is acceptable for a man to beat his wife.	0.673

Factor 2 was comprised of two strongly correlated items – *Beat* (0.781) and *Accept* (0.693). They represented the only two items in the questionnaire that dealt with physical violence as a component of IPV.

Table 3.7. Factor 3: Right of refusal

Variable	Questionnaire item	Factor loading
<i>Refuse</i>	Women have the right to refuse to have sex with their partners.	0.636
<i>Commrefuse</i>	Do most people in your community feel women have the right to refuse to have sex with their partners?	0.442

Factor 3 represented individuals' views on women's right to refuse sex. The factor had one item with a loading greater than 0.50, *Refuse* (0.636). The second item, *Commrefuse* (0.442), represented the same question but adjusted to capture community views on the subject as perceived by the interviewee.

Table 3.8. Factor 4: Condom use

Variable	Questionnaire item	Factor loading
<i>Condom</i>	Do most people in your community feel its okay for a man to expect sex without a condom?	0.639
<i>Expect</i>	It's okay for a man to expect sex without a condom.	0.483

Factor 4 contained two items, but only one question, pertaining to condom use. Again, the same item, "its okay for a man to expect sex without a condom," was reworded to capture subjective norms. The item, *Condom*, had the strongest factor loading of 0.639. *Expect* had a factor loading of 0.483.

Table 3.9. Factor 5: Violence against women (VAW)

Variable	Questionnaire item	Factor loading
<i>Do</i>	Can your community do anything about violence against women?	0.757
<i>Serious</i>	Is violence against women considered a serious problem in your community?	0.740

The final factor included two items related to how the community viewed violence against women. It was dominated by *Do* (Can your community do anything about VAW?) with a factor loading of 0.757. It was followed closely by *Serious* (0.740).

Five questionnaire items did not load significantly (>0.40) onto any factor. They were *Older*, *Know*, *Rape*, *Private* and *Violence*, and were not used in factor interpretation.

3.3.3 Sensitivity analysis

The sensitivity analysis was conducted to determine if there were systematic differences between first household respondents and the remaining household members. It showed there to be statistically significant differences ($p < 0.05$) between first household respondents and other household respondents in five of the six selected covariates – age, income, primary education, history of IPV, and current partner status. However, upon closer examination of the frequencies, it was evident that the statistically significant p-values were more likely a result of the large sample size than of actual systematic differences between the two groups. The exceptions to this were age and income. First household respondents were more likely to be older (>24 years), less likely to have an income, and more likely to be missing data on their income.

Table 3.10. Sensitivity analysis comparing first household respondents and other respondents

Covariate	P-value	First household member Frequency (%)	Other household members Frequency (%)
Age	p<0.001		
16-24 years		6175 (37.0)	2043 (52.0)
25-44 years		8330 (49.9)	1522 (38.7)
45-60 years		2107 (12.6)	347 (8.8)
Missing		95 (0.6)	20 (0.5)
Sex	p=0.35		
Male		7019 (42.0)	1615 (41.1)
Female		9585 (57.4)	2287 (58.2)
Missing		103 (0.6)	30 (0.8)
Primary education	p=0.01		
No		1364 (8.2)	352 (9.0)
Yes		14713 (88.1)	3469 (88.2)
Missing		630 (3.8)	111 (2.8)
History of IPV	p=0.01		
No		12931 (77.4)	3006 (77.2)
Yes		2722 (16.3)	625 (15.9)
Missing		1054 (6.3)	301 (7.7)
Current partner	p=0.01		
No		3745 (22.4)	885 (22.5)
Yes		12309 (73.7)	2932 (74.6)
Missing		653 (3.9)	115 (2.9)
Income	p<0.001		
No		1537 (9.2)	316 (8.0)
Yes		13139 (78.6)	3291 (83.7)
Missing		2031 (12.2)	325 (8.3)

Given the significant differences in age and income between the two groups, an exploratory factor analysis was also conducted on the group of other respondents (n=3,765) to be compared to the results of first household respondents. The result was a 4-factor solution due to a severe Heywood case when calculating a 5-factor solution that prematurely terminated the analysis.

Table 3.11. Exploratory factor analysis results for remaining household respondents (n=3,765)

Variable	F1	F2	F3	F4
<i>Gift</i>	0.608	0.429	-0.059	0.020
<i>Older</i>	0.331	0.383	-0.179	0.028
<i>Refuse</i>	0.021	0.009	0.648	0.009
<i>Expect</i>	0.466	0.131	0.026	-0.116
<i>Love</i>	0.553	0.391	0.112	-0.025
<i>Fault</i>	0.268	0.379	-0.070	0.053
<i>Know</i>	0.058	0.269	0.046	0.021
<i>Rape</i>	0.049	0.047	0.303	-0.061
<i>Private</i>	0.203	0.346	0.083	-0.053
<i>Beat</i>	0.125	0.706	0.092	-0.112
<i>Accept</i>	0.087	0.618	-0.054	-0.044
<i>Right</i>	0.444	0.316	-0.082	0.009
<i>Commrefuse</i>	-0.058	-0.029	0.480	-0.119
<i>Commcondom</i>	0.389	-0.095	0.080	-0.085
<i>Serious</i>	0.023	-0.060	0.055	-0.811
<i>Do</i>	0.052	0.003	0.162	-0.824
<i>Violence</i>	-0.057	-0.072	-0.044	0.352

Factors 2 and 3 mimicked the factors *Physical violence* and *Right of refusal* for first household respondents. Factor 1 for other household respondents included *Gift*, *Love* and *Fault*, as in Factor 1 for first household respondents, but it also included *Right* – a variable related to condom use and one that represented its own factor for first household respondents. Factor 4 for other household respondents included the same items as Factor 5 for first household respondents, *Do* and *Violence*, but changed signs, suggesting that other household respondents have opposite views on violence against women than first household respondents.

3.4 Discussion

The exploratory factor analysis reduced the 17 IPV items from the SR1 study down to five factors. The factors were interpreted to represent: *Reciprocity*, *Physical violence*, *Right of refusal*, *Condom use*, and *Violence against women*. These interpretations did not coincide with the steps in the CASCADA model. Four of the five factors included only two items with factor loadings greater than 0.40. Two of the factors (*Condom use* and

Right of refusal) each contained the same question twice, but reworded to differentiate between individual and subjective norms. Five of the 17 questionnaire items did not load significantly onto any factor. They were *Older, Know, Rape, Private* and *Violence*.

The 17 IPV items in the SR1 study were developed as part of a larger questionnaire exploring the impact of “edutainment” on behaviour change related to HIVAIDS prevention, not IPV prevention specifically. One objective of SR1 was to test the validity of the CASCADA model as an alternative to other IPV validated tools. The model was used to develop questions on a series of HIV-related issues for the SR1 study, including IPV prevention. While CIET was able to develop questions for every step in the cascade for issues that are more linear, e.g. HIV testing, where it was clear what the best indicators were for conscious knowledge, attitudes, subjective norms, etc, it was not possible to do the same for the IPV CASCADA. One complicating factor was that there exists two cascades – one for violence perpetrators and one for victims. Furthermore, it was difficult to identify what knowledge or intentions would help someone from being abused by a spouse. These limitations point to the need for further work on the IPV CASCADA model.

Compared to the other measurement tools outlined in Chapter 1, the SR1 study had a similar number of items but more factors (some made up of only two items) and weaker factor loadings. The Intimate Partner Violence Attitudes Scale (IPVAS) had 22 items and three factors: Abuse, Control and Violence that were confirmed by Fincham et al (34). There were no similarities between the SR1 items and those of the IPVAS. On the other hand, out of the 24 items contained in the GEM scale, three were similar to SR1 items: (1) There are times when a woman deserves to be beaten; (2) It is okay for a man to hit his wife if she won't have sex with him; and (3) If a woman cheats on a man, it is okay for him to hit her.

Other existing scales did not attempt to differentiate between individual and subjective norms, as in the case of SR1. Indeed, the results of the EFA indicated that items grouped by topic. For example, “Do most people in your community feel it's okay for a man to

expect sex without a condom?” and “It’s okay for a man to expect sex without a condom,” constituted one factor, instead of subjective norms grouping together, such as, “Do most people in your community feel it’s okay for a man to expect sex without a condom?” and “Do most people in your community feel women have the right to refuse to have sex with their partners?” No literature or scale could be located that applied this differentiation. Another EFA of the SR1 study without the subjective norms items would likely reveal a different factor structure, and should be examined.

The greatest limitation of the current study was the strategy used to remove one level of data to control for clustering. Clustering within households was eliminated by selecting the first respondent in each household for the analysis. This approach was selected because it was the most straightforward, while randomly selecting one respondent per household would have required resources beyond the scope of this study. A sensitivity analysis showed that there were significant differences between first respondents and other household respondents on age and income ($p < 0.001$). First household respondents were more likely to be older (> 24 years), less likely to have an income, and more likely to be missing data on their income. When the EFA results were compared between first household respondents and other household respondents, clear differences emerged. These differences suggested that the generalizability of the results may be limited.

Twenty-four percent of respondents were missing data on at least one IPV questionnaire item. While efforts were made to identify the cause of missingness (MCAR, MAR or MNAR), there was no way to definitively identify why individuals did not respond to one or more questions. The analysis was conducted assuming data were missing at random, but it was possible that some respondents did not answer questions due to their content. The subject of intimate partner violence is a sensitive subject that is not easily discussed in southern Africa. However, as the missing data patterns indicated, only 98 respondents (0.06%) were missing values on all 17 items and 2,503 (15.0%) respondents were missing only one value. If respondents were not answering questions due to their content, we would expect more individuals to not respond to all IPV-related questions, but this was not the case here. Given that 15% were missing only one value, it may be

that the loss of data was not related to the questions themselves, but to unrelated causes, such as interviewers forgetting to ask a question or data being lost on certain variables. This would point in the direction of MAR or MCAR as the reason for missingness.

Finally, the reliability of the IPV items as a measurement instrument could not be formally evaluated because Mplus 5.0 does not calculate Cronbach's alpha. Cronbach's alpha is a coefficient of consistency and measures how well a set of variables or items measures a single, unidimensional latent construct. As an alternative, Mplus 5.0 calculates factor determinancy (the correlation between the estimated and true factor scores) but this calculation is not available for complex data analysis in Mplus 5.0, thus could not be used for this study.

There is a paucity of research into attitudes and behaviours related to intimate partner violence. More research is needed to better understand the attitude and behaviours in the promulgation of IPV, and this must begin with the development of reliable and valid tools for measurement. The IPV items from the SR1 study provided some unique results, but with low initial correlations it is questionable whether the items were measuring the same overall construct. A confirmatory factor analysis may give a better indication of the appropriateness of the items as indicators of the CASCADA model steps, but this was beyond the scope of this study. In the meantime, researchers should continue to build on existing measurement tools through soundly designed operational research.

4.0 Associations between HIV knowledge sources and intimate partner violence attitudes and behaviours

4.1 Introduction

Behaviour change is not a linear process. Many studies show that knowledge of HIV, how it is transmitted, and how to protect oneself from infection is well-known in many parts of southern Africa, yet the region has the highest infection rates worldwide. Thus how does one move from knowledge to action? What strategies work to have people to adopt more healthy behaviours? Are there information sources or programs out there that are working better than others? The objective of Chapter 4 was to begin to answer these questions.

Models for behaviour change vary from targeting individual-level change (e.g. the Health Belief Model) to social change (e.g. Social Network Theory) and structural change (e.g. the Empowerment Model). No one strategy or theory has been found sufficient when it comes to HIV and IPV prevention. The role of attitudes in affecting behaviour change is an area that requires further exploration, but evidence does exist linking unhealthy attitudes with increased levels of intimate partner violence, though the research is conducted in a developed country setting (26;27).

Building on the five factors identified in Chapter 3 that represent the latent constructs of the 17 intimate partner violence items in the SR1 study, the objectives of Chapter 4 were:

1. To explore the relationships between an individual's views on IPV and where they obtained information about HIV/AIDS using regression techniques.
2. To identify sources of knowledge that may promote more healthy views on IPV, recognizing that IPV is a driver of the HIV/AIDS epidemic in southern Africa and that healthy views on IPV can facilitate more healthy sexual behaviour.

4.2 Methods

Regression analyses were conducted to relate the continuous latent variables, or factors, constructed in the EFA in Chapter 3 to respondents' sources of knowledge on HIV/AIDS. All SR1 respondents were asked the open-ended question: "From whom/where did you learn what you know about HIV/AIDS?" Given the wide range of knowledge sources specified by participants, the first step was to categorize their responses by source type to simplify the analysis. Knowledge sources were grouped by type of organization. For example, all NGOs were grouped together, as were all sources related to medical institutions. Once the categories were identified, each category was made into a dichotomous variable (0=not source; 1=source). A total of nine categories were identified. The categories with their respective membership are listed in Appendix I.

Table 4.1. Categories of SR1 HIV/AIDS knowledge sources and their respective frequencies (n=16,707)

Category	Frequency (%)
Nowhere	2.14
Medical institutions	15.06
Media	43.62
Peers or family	10.14
NGOs/community activities	6.52
International organizations	0.12
Schools/workplace	15.66
Religious institutions	1.62
CIET interview	0.02

Six covariates were selected for inclusion in the regression analyses: sex, age, primary education level, income, history of intimate partner violence, and current partner status. All covariates were initially tested for significant associations with the factors using both univariate and multivariable regression analyses, but were kept in the model regardless of their p-values.

Table 4.2. Selected SR1 covariates and their respective frequencies (n=16,707)

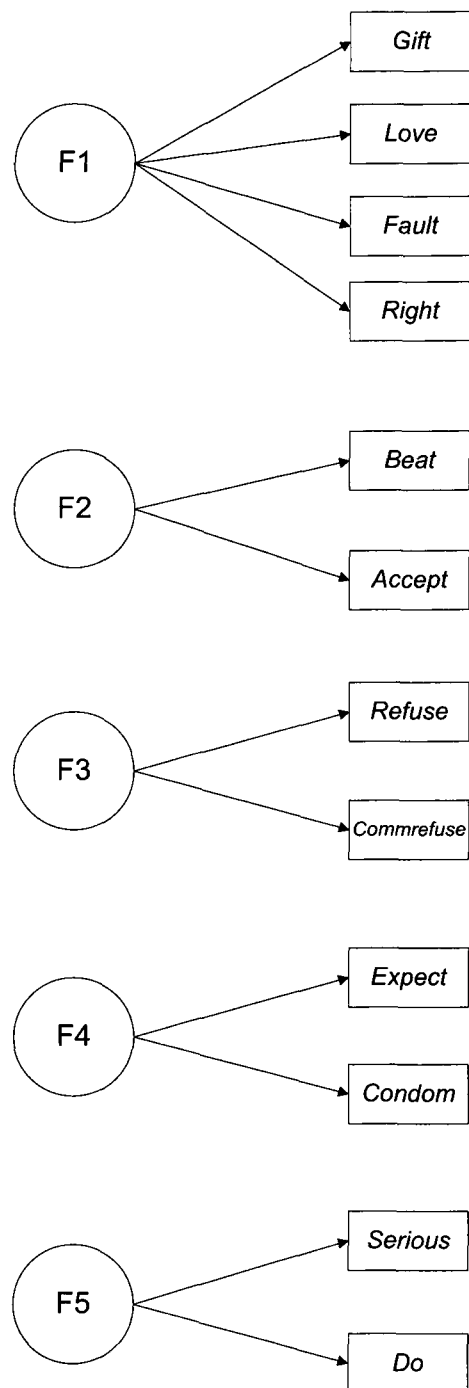
Covariate	Category	Frequency (%)
Income	No	9.2
	Yes	78.6
	Missing	12.2
Age	16-24 years	37.0
	25-44 years	49.9
	45-60 years	12.6
	Missing	0.6
Sex	Male	42.0
	Female	57.4
	Missing	0.6
History of IPV	No	77.4
	Yes	16.3
	Missing	6.3
Current partner	No	22.4
	Yes	73.7
	Missing	3.9
Primary education	No	8.2
	Yes	88.1
	Missing	3.8

The extracted factors from the EFA were then regressed onto the categories of HIV/AIDS knowledge sources. In Mplus 5.0, the ON Statement (short for *regressed on*) can be used to describe the regression relationship between an unobserved latent variable (in this case, the extracted factors from the EFA) and an observed independent variable, while also taking into account complex survey design. Again, the data weighting (by country), stratification (by enumeration area type) and clustering (at the enumeration area level) as a result of the survey design were incorporated in the analysis. The weighted least squares estimator (WLSMV) was applied because the variables composing the factors were binary.

The factors from Chapter 3 were recreated for this analysis using the BY statement in Mplus 5.0. The BY statement is used to name and define the continuous latent variables in the model. Each BY statement can be thought of as a set of ON statements that describes the regressions of a set of observed variables (IPV items) on a continuous latent variable (factor). The parameters that are estimated are the factor loadings. These are the

coefficients for the regressions of the IPV items on the five factors. Figure 4.1 illustrates the five factors and their respective observed dependent variables. The rectangles represent the observed dependent variables (IPV items) from the SR1 study. The circles represent the five factors (latent variables).

Figure 4.1. Reconstruction of five factors using Soul City Regional Evaluation study intimate partner violence items



Each factor was then separately regressed onto each source of knowledge while also controlling for the covariates. This was followed by a multivariable analysis that regressed each factor onto all knowledge sources and covariates simultaneously. The knowledge source, *Nowhere*, was used as the reference category in the multivariable analyses.

The regressions were then repeated to provide standardized parameter estimates using the Delta method in Mplus. Standard errors (SEs) and p-values were not provided because Mplus cannot compute SEs for standardized parameter estimates when the WLSMV estimator is used (85). However, for the interpretation of results, it was assumed that non-standardized estimates that were significant would also be significant once standardized. All parameter estimates reported in the results and discussion sections are standardized.

4.3 Results

Table 4.3 and Table 4.4 provide the standardized and covariate-adjusted univariate and multivariable results. Unadjusted results can be found in Appendix J.

Most HIV/AIDS knowledge sources were found to reduce unhealthy views on IPV on at least one of the five factors. The exceptions were individuals' who cited "nowhere" and the CIET interview as their source of knowledge on HIV/AIDS. In the univariate analysis, only schools/workplaces and international organizations were found to consistently reduce unhealthy views on all five factors, but not all results were statistically significant ($p < 0.05$). In comparison, the multivariable analysis found 6 out of 9 sources (*Medical*, *Media*, *Peers*, *NGO*, *School*, and *Interl*) to consistently reduce unhealthy views across all factors, but again, not all results were significant.

Overall, no single source was found to significantly reduce unhealthy views on all factors. In the univariate analysis, the knowledge source with the most significant results was *Media*. *Media* significantly reduced unhealthy views on 4 factors – *Reciprocity*,

Physical Violence, Right of Refusal, and Condom Use. On the flip side, *Nowhere* was significantly associated with increased unhealthy views on all factors with the exception of *Right of Refusal*.

In the multivariable analysis, *NGO* and *School* had the most promising results. Both significantly reduced unhealthy views on *Reciprocity, Physical Violence, Condom Use,* and *VAW*.

Table 4.3. Covariate-adjusted univariate regression results (standardized)

Source	Reciprocity		Physical Violence		Right of Refusal		Condom Use		Violence Against Women	
	Est.	P-value	Est.	P-value	Est.	P-value	Est.	P-value	Est.	P-value
Nowhere	0.043	0.008	0.088	0.000	0.028	0.186	0.046	0.013	0.040	0.008
Medical institutions	0.021	0.184	-0.001	0.976	0.051	0.001	0.051	0.014	-0.026	0.217
Media	0.085	0.000	-0.039	0.045	-0.087	0.001	0.072	0.008	-0.017	0.363
Peers or family	-0.041	0.053	-0.005	0.781	0.048	0.030	-0.089	0.000	0.060	0.001
NGOs/community activities	-0.058	0.008	-0.006	0.717	0.035	0.189	-0.039	0.074	-0.023	0.265
International organizations	-0.104	0.000	-0.001	0.934	-0.033	0.095	-0.075	0.000	-0.019	0.271
Schools/workplace	0.001	0.927	0.039	0.003	0.026	0.102	-0.018	0.273	0.025	0.072
Religious institutions	-0.010	0.215	-0.001	0.955	-0.032	0.000	-0.004	0.642	-0.016	0.074
CIET interview	0.015	0.251	0.015	0.128	0.004	0.793	0.030	0.134	0.018	0.273

Table 4.4. Covariate-adjusted multivariable regression results (standardized)

Source	Reciprocity		Physical Violence		Right of Refusal		Condom Use		Violence Against Women	
	Est.	P-value	Est.	P-value	Est.	P-value	Est.	P-value	Est.	P-value
Nowhere	-	-	-	-	-	-	-	-	-	-
Medical institutions	-0.063	0.082	-0.172	0.000	-0.004	0.932	-0.057	0.145	-0.103	0.003
Media	-0.090	0.053	-0.269	0.000	-0.111	0.075	-0.103	0.052	-0.119	0.006
Peers or family	-0.120	0.002	-0.157	0.000	-0.001	0.991	-0.167	0.000	-0.021	0.541
NGOs/community activities	-0.115	0.000	-0.122	0.000	-0.001	0.970	-0.101	0.002	-0.078	0.002
International organizations	-0.179	0.000	-0.160	0.000	-0.072	0.085	-0.158	0.000	-0.093	0.001
Schools/workplace	-0.033	0.055	-0.029	0.140	0.008	0.736	-0.056	0.012	-0.004	0.829
Religious institutions	-0.018	0.038	-0.015	0.155	-0.035	0.000	-0.015	0.133	-0.024	0.010
CIET interview	0.013	0.269	0.011	0.311	0.004	0.805	0.025	0.192	0.016	0.299

4.3.1 No source of knowledge

Nowhere, as a source of knowledge on HIV/AIDS, trended towards a positive association with unhealthy views on intimate partner violence, meaning individuals who did not have a source of knowledge on HIV/AIDS were more likely to have unhealthy views related to IPV. In the univariate, unadjusted results, *Nowhere* was significantly and positively associated with *Reciprocity* ($p<0.001$), *Physical Violence* ($p<0.001$), *Condom Use* ($p=0.002$), and *VAW* ($p=0.011$). When controlling for age, sex, education, income, history of violence, and relationship status, the results remained significant ($p\leq 0.013$).

Multivariable analysis results were not calculated because *Nowhere* was used as the reference category.

4.3.2 Medical institutions

Medical had predominantly positive associations with unhealthy views on IPV in the univariate analyses, again indicating the people who cited medical institutions as their primary source of knowledge on HIV/AIDS were more likely to hold unhealthy views. Medically-related sources of knowledge were significantly associated with *Right of Refusal* in both the adjusted and unadjusted results ($p<0.001$).

However, in the multivariable analyses, the association between *Medical* and unhealthy views on IPV switched to the negative. Unadjusted results showed significant, negative associations with *Reciprocity* ($p=0.006$), *Right of Refusal* ($p<0.001$) and *VAW* ($p=0.005$). Adjusted multivariable results remained significant for *Right of Refusal* ($p<0.001$) and *VAW* ($p=0.003$).

4.3.3 Media

Media produced mixed results in the univariate analyses, but was more consistently associated with a decrease in unhealthy views in the multivariable analyses. Unadjusted, univariate results produced positive associations between *Media* and *Reciprocity* ($p<0.001$), and *Condom Use* ($p<0.001$). However, a significant negative association was found with *Right of Refusal* ($p=0.009$). The significant associations remained after

controlling for the covariates, and a further significant, negative association was found between *Media* and *Physical Violence* ($p < 0.001$).

Multivariable, unadjusted results for *Media* revealed significant, negative associations with all five IPV factors ($p \leq 0.034$), indicating *Media* as a source of knowledge reduced the likelihood of a person having unhealthy IPV attitudes. After adjusting for potential confounders, significant, negative associations remained for *Physical Violence* ($p < 0.001$) and *VAW* ($p = 0.006$) only.

4.3.4 Peers

The unadjusted univariate results for *Peers* showed significant and positive associations with *Right of Refusal* ($p = 0.021$) and *VAW* ($p = 0.002$), but there were also significant negative associations with *Reciprocity* ($p = 0.041$) and *Condom Use* ($p < 0.001$). After controlling for the 6 covariates, univariate results maintained the significant positive associations between *Peers* and *Right of Refusal* ($p = 0.030$) and *VAW* ($p = 0.001$) and the negative association with *Condom Use* ($p < 0.001$).

The unadjusted multivariable results showed significant and negative associations between *Peers* and *Reciprocity* ($p < 0.001$), *Physical Violence* ($p < 0.001$), and *Condom Use* ($p < 0.001$). Adjusted results were the same ($p \leq 0.002$).

4.3.5 NGOs and community-based activities

NGOs as a source of knowledge on HIV/AIDS were significantly associated with a decrease in unhealthy views related to *Reciprocity* in the univariate analyses before and after controlling for potential confounders ($p \leq 0.008$).

The multivariable, unadjusted results expanded to include a decrease in unhealthy views on *Physical Violence* ($p < 0.001$), *Condom Use* ($p = 0.001$) and *VAW* ($p = 0.001$), in addition to *Reciprocity* ($p < 0.001$). These results remained the same for the adjusted, multivariable analysis ($p \leq 0.002$).

4.3.6 Schools and workplaces

School was found to reduce unhealthy views related to four out of the five IPV factors in the univariate, unadjusted analyses – *Reciprocity* ($p<0.001$), *Physical Violence* ($p<0.001$), *Right of Refusal* ($p<0.001$), and *Condom Use* ($p<0.001$). Once adjusted, the results remained negative and significant for *Reciprocity* ($p<0.001$) and *Condom Use* ($p<0.001$).

Multivariable results continued the negative trend, with significant values for all five IPV factors in the unadjusted analysis ($p\leq 0.004$). In the adjusted analysis, results remained negative and significant for all factors except *Right of Refusal* ($p=0.085$).

4.3.7 Religiously-affiliated groups

The relationship between *Religious* and the IPV factors gave mixed results. The univariate, unadjusted results showed negative but not significant associations between *Religious* and *Reciprocity* ($p=0.287$) and *Condom Use* ($p=0.418$). Positive associations were found with *Physical Violence* ($p=0.006$), *Right of Refusal* ($p=0.151$), and *VAW* ($p=0.093$). After adjusting for the covariates, positive associations were found with all factors except condom use. The only significant result was for *Physical Violence* ($p=0.003$).

In contrast, the multivariable results showed negative relationships across all factors and religiously-affiliated groups as a primary source of knowledge on HIV/AIDS. Significant results were found for *Reciprocity* ($p<0.001$), *Physical Violence* ($p=0.024$), and *Condom Use* ($p=0.003$). In the adjusted analysis, the direction for *Right of Refusal* changed direction. Results were significant only for *Condom Use* ($p=0.012$).

4.3.8 International organizations

International organizations as a primary source of knowledge consistently reduced unhealthy views on IPV across all five factors. In the univariate, unadjusted analyses, results were significant for *Reciprocity* ($p=0.046$), and *Right of Refusal* ($p<0.001$). The adjusted results were significant for *Right of Refusal* only ($p<0.001$).

Multivariable results were significant for *Reciprocity* ($p=0.002$), *Right of Refusal* ($p<0.001$), and *VAW* ($p=0.030$). These results remained consistent once controlling for confounders ($p\leq 0.038$).

4.3.9 CIET interview

The CIET interview as the primary source of knowledge on HIV/AIDS was positively associated with unhealthy views on intimate partner violence across all factors. Results were significant in the univariate, unadjusted results for *Condom Use* ($p=0.047$), but were not significant in any other analyses.

4.4 Discussion

The univariate analyses showed that, when examined individually and after controlling for possible confounders, the majority of sources of knowledge on HIV/AIDS trended towards reducing unhealthy views on IPV. The exceptions to this finding were *Nowhere* and *CIET*, both of which were associated with increased unhealthy views, though not all results were significant. In the case of the CIET interview as the main source of knowledge on HIV/AIDS, these results were unreliable given the very small sample size ($n=3$).

The multivariable analysis compared each source to *Nowhere* while simultaneously controlling for the other 7 sources included in the model. When compared to *Nowhere*, *NGO* and *School* produced the most promising results. They significantly reduced unhealthy views on four of the five factors; the exception being *Right of Refusal*. The poorest performer, besides *CIET*, was *Religious*. Religiously-affiliated sources of knowledge on HIV/AIDS significantly reduced unhealthy views on *Condom Use*, but were associated with an increase in unhealthy views on *Right of Refusal*.

The most commonly cited knowledge source was the media (43.6%), followed closely by schools/workplace (15.6%) and medical institutions (15.1%). *Media* had mixed results in the univariate analysis. It was significantly associated with an increase in unhealthy

views related to *Reciprocity* and *Condom Use*, but significantly decreased unhealthy views on *Physical Violence* and *Right of Refusal*. When compared to *Nowhere* in the multivariable analysis, *Media* had negative associations with all 5 factors, and was significantly associated with a decrease in unhealthy views on *Physical Violence* and *VAW*. The magnitude of the coefficient for *Physical Violence* for *Media* increased almost seven-fold from -0.039 to -0.269 between the univariate and multivariable analyses.

A lot of focus in recent years has been placed on using mass media as a vehicle for public health messaging, including for HIV and IPV prevention. Programs such as Soul City (<http://www.soulcity.org.za/>) and LoveLife (<http://www.lovelife.org.za/>) are using print, radio, and television in developing countries to get prevention messaging out to the public, and their reach appears to be significant, given the high number of SR1 respondents that cited media as their main source of knowledge on HIV/AIDS.

The research summarized in Chapter 1 showed that mass media interventions have had mixed results, with some reviews pointing to their effectiveness (30) and others indicating only moderate effects that do not have sustained impact. Bertrand et al found mass communication interventions to not have low or moderate effects in only some cases, while a Cochrane Review found no long term effects on HIV testing uptake (32;33). While these research papers did not look specifically at IPV prevention, they do indicate that mass media may not always be effective when it comes to sustained behaviour change. It may be, again, that the provision of accurate information cannot act alone in behaviour change but requires additional supports to spur structural transformations that empower individuals to make healthier choices.

While SR1 respondents were asked to identify a source of knowledge only, it is likely that some HIV/AIDS knowledge sources offered other services beyond simple information provision. These services could include other cultural, social or structural interventions that build on knowledge provision and are seen as necessary for lasting behaviour change. Such a scenario would most likely be true for almost every source category with the exceptions of *Media* and *Nowhere*. This could explain why *School*,

NGO, and to a slightly lesser extent, *Peers*, were more likely to promote healthy views related to IPV. These findings are in line with those of the Global HIV Prevention Working Group that also concluded that interventions targeting interpersonal relationships, societal norms, community engagement and political support were needed, in addition to individual knowledge, for behaviour change (86).

Univariate and multivariable results were substantially different. In many cases, coefficients changed signs and/or significance. For example, in examining Factor 4, *Condom Use*, we see that *Nowhere*, *Medical* and *Media* are significantly associated with increased unhealthy views on IPV, while *Peers* and *School* are significantly associated with a decrease in unhealthy views. In comparison, the multivariable analysis results on the same factor showed significant, negative results for *Peers*, *NGO*, *School*, and *Religious*, where *NGO* and *Religious* were not significant in the univariate analysis and had a positive association with unhealthy views on IPV. *Media* and *Medical* changed direction but were no longer significant, and *Nowhere* was the reference category.

The differences between univariate and multivariable results indicated that sources of knowledge may be interacting with one another in a manner that moderates each source's effectiveness in reducing unhealthy IPV views. Once all sources were controlled for in the multivariable analysis, there was a clearer picture of how each source affects IPV views independently. However, it is unlikely that a person was exposed to only one source of knowledge on HIV/AIDS given the high prevalence rates and correspondingly high investments in HIV prevention, care, treatment and support in southern Africa. A source in and of itself may be effective, but its impact may be mediated by less effective sources. More analysis is needed to tease out the interactions between knowledge sources.

This study can only point us in the general direction of possible information sources of healthy views on intimate partner violence. Given the cross-sectional nature of the data and the limited data collected on respondents' sources of knowledge, there is no way to know what exactly about the sources promoted healthy (or unhealthy) views. In

particular, there is no way to discern from this research to what extent it was “the message” versus “the medium” that had the desired impact on individuals’ views.

Misclassification of the HIV/AIDS knowledge sources may have occurred. Some sources were labelled only by their acronym on the SR1 data code sheet, and their identification had to be done via an Internet search. CIET International, the organization that collected and collated the data, was also contacted to assist in identification.

As in Chapter 3, there were limitations due to missing data and clustering. These were explained in the previous chapter. Other statistical limitations included the inability to calculate confidence intervals in Mplus 5.0 and the absence of interaction terms in the model.

A final limitation was that the SR1 study collected information on HIV/AIDS knowledge sources, and not IPV knowledge sources. This study made the assumption that HIV/AIDS knowledge sources could act as a proxy for the true variable of interest. Chapters 1 and 2 showed that links are increasingly being made between HIV and IPV prevention efforts, thus the assumption that sources would address both is not without justification.

It is clear that more research is needed into the effectiveness of different types of interventions – peer-based versus school-based versus edutainment, etc. This study has added to the questions about the effectiveness of mass media interventions in particular, and has added to the body of evidence confirming the effectiveness of school-based/workplace-based interventions and NGO-led/community-based activities for the prevention of IPV.

There is also a need to look more closely at what it is exactly that makes some interventions more effective than others. A comparison of content between knowledge sources would be informative to begin to tease out the impact of the medium compared to

the message. Such research could begin with a focus on sources or interventions that are showing promising results, such as school-based/workplace-based interventions.

5.0 Overall discussion

This study built on the existing yet sparse literature on intimate partner violence measurement and prevention research with a focus on attitude and behaviour change in the southern African context. The rationale for tackling this subject was that IPV is a driver of the HIV/AIDS epidemic in southern Africa, and that reducing or preventing IPV will contribute to the primary prevention of HIV/AIDS.

Chapter 1 provided an overview of key literature on HIV, IPV and behaviour change. It looked at the strong interconnections between the HIV epidemic in southern Africa and the prevalence of intimate partner violence. It reviewed different methods of HIV and IPV prevention, and focused specifically on the theory and practice of behaviour change as a prevention strategy. It showed that behaviour change activities need to target not just the individual, but also socio-cultural and structural components that make IPV an acceptable practice. It also showed that a change in attitudes is a valuable precursor to behaviour change. The chapter highlighted some of the existing evidence of effective HIV/IPV prevention interventions, but also demonstrated the need for more systematic evaluations of interventions, especially for IPV prevention. Finally, it highlighted the absence of a gold standard for measuring knowledge, attitudes and practices related to IPV.

Chapter 2 examined the current available evidence of IPV prevention interventions in a developing country context through the application of systematic review techniques. It identified six studies, all located in sub-Saharan Africa, that sought to prevent or reduce IPV through behaviour change and evaluated their quality and results. The conclusions of the review echoed previous findings outlined in Chapter 1 – interventions that took place in a community or school/work setting were found to be effective strategies for behaviour change, as was a mass media campaign. The heterogeneity of study designs and outcome measures prevented the conduct of a meta-analysis, and again highlighted the need for consistency in how researchers measure and evaluate IPV interventions.

Chapter 3 provided the first introduction to the Soul City Regional Evaluation Phase 1 study (SR1). The study included 17 variables related to IPV, and this chapter applied exploratory factor analysis techniques to the complex, multilevel and correlated data of SR1. The objective was to identify latent constructs in order to simplify the analyses to be conducted in Chapter 4. The EFA found five factors in the data – *Reciprocity*, *Physical Violence*, *Right of Refusal*, *Condom Use*, and *Violence against Women (VAW)*. Five of the 17 SR1 IPV items did not have factor loadings greater than 0.40, indicating that they contributed little to the factors, and were not included in factor interpretation. The SR1 factors did not reflect the CASCADA model on which the creation of the 17 items was based; however a confirmatory factor analysis would be a more appropriate statistical technique for evaluating model fit. There were also few similarities between the SR1 IPV items and other IPV measurement tools, in particular the IPVAS and GEM scale. This chapter highlighted the need for further research to develop a consistent tool for the measurement of IPV-related knowledge, attitudes and practices.

Chapter 4 took the five factors from the EFA and examined their associations with HIV/AIDS knowledge sources, as identified by SR1 study participants using univariate and multivariable regression techniques. Sources were categorized according to type – “nowhere,” medical institutions, the media, peers/family, schools/workplaces, NGOs/community activities, religiously-affiliated organizations, international organizations, and the CIET interview (conducted as part of the SR1 study). Univariate and multivariable regressions of the factors onto the knowledge sources showed that most sources (with the exceptions of *Nowhere* and the CIET interview) were associated with a decrease in unhealthy views on intimate partner violence by SR1 study respondents. The multivariable regressions identified school/workplace-based interventions, NGOs and community-based activities as having some of the most significant results in the desired direction. These findings were consistent with the evidence summarized in Chapter 1, but the differences in univariate and multivariable analysis results for some sources of knowledge points to possible interactions between sources that affect intervention effectiveness. In addition, the lack of significant results to add to the evidence of the effectiveness of mass media campaigns was surprising given the amount of attention paid

to these strategies in the literature and the large number of SR1 respondents who identified these resources as their primary information source.

Various limitations related to this research were highlighted in the previous chapters. Of particular note were the statistical limitations related to the analyses of the SR1 study data.

- (1) Missingness. There was a large amount of missing data that needed to be addressed through statistical analysis. We were able to employ the gold standard, multiple imputation, but this approach can still contain bias if the data were not missing at random or if the multiple imputation model was incorrect. Efforts were made to identify the type of missingness in the data, and a MAR assumption could not be ruled out.
- (2) Clustering. The removal of one level of data by selecting first household respondents may have biased results. A sensitivity analysis showed that there were significant differences between first respondents and other respondents in terms of age and income. A preferred method would have been to randomly select a respondent per household, but this was beyond the scope of the current research.
- (3) Weak to moderate correlations. The correlations between the 17 IPV items were predominantly weak to moderate.
- (4) Self-report bias. Data were collected through face-to-face interviews and respondents may have provided answers that were more socially desirable, resulting in biased data. This deficiency could only be addressed through study design.
- (5) Confidence intervals. The reliance on p-values as a measure of significance was not the preferred option given the large sample size, but the software package, Mplus 5.0, did not allow for the calculation of confidence intervals with complex, multilevel data and multiple imputation.

Another limitation was that the SR1 study was not specifically designed to assess IPV attitudes and behaviour change. While IPV-related items were included as part of the

household survey, the primary objective of the study was to assess the impact of edutainment programs on HIV/AIDS prevention. As a consequence, we had to use HIV/AIDS knowledge sources as a proxy for IPV knowledge sources. However, Chapter 1 showed that HIV and IPV prevention activities are being increasingly linked in southern Africa, thus this assumption was not without merit.

5.1 Future research directions

This study has identified a number of gaps in IPV prevention research in the developing world. First, there is a significant need for more rigorous evaluations of interventions. The randomized controlled trials of Jewkes, Ross and Pronyk in Chapter 2 demonstrated that this can be accomplished. Chapter 2 also showed that well-designed quasi-experiments, such as the one conducted by Usdin et al, have valuable information to contribute and should be pursued.

Second, a standard method for measuring IPV also needs to be developed. This includes not only establishing a standard measure for IPV incidence, but also a method for measuring IPV-related knowledge, attitudes and practices to assist us in acquiring a better understanding of how people translate knowledge into action.

Third, a closer look is needed into why some interventions are more successful at promoting behaviour change than others, and if those successful aspects can be replicated or scaled-up. More specifically, as was discussed in Chapter 4, it is not always clear to what extent the medium (i.e. community activities, peer education, media, etc) or the message (i.e. the content) is contributing to positive behaviour change. Furthermore, how different interventions interact with one another needs to be further explored as interactions may be inhibiting rather than promoting positive behaviour change.

5.2 Conclusion

Some general conclusions about IPV prevention interventions in a developing country context can be drawn from this research. First, this study added to the body of knowledge

that IPV prevention interventions cannot just target the individual level for behaviour change. The systematic review in Chapter 2 showed that interventions that were community- or school/workplace-based and that addressed structural barriers to behaviour change (e.g. microcredit programs to empower women financially) were most effective at reducing IPV rates and producing more healthy views on IPV on the part of respondents. Chapter 4 echoed these findings, as school- and workplace-based interventions, community-based interventions, and those led by NGOs were found to most consistently reduce unhealthy views on intimate partner violence in SR1 study respondents. In all instances, the development of culturally appropriate interventions was a distinguishing characteristic of interventions.

Second, there is evidence to support the effectiveness of mass media interventions for IPV prevention, but it is not robust. Questions remain around the size and longevity of the impact on behaviour change by mass media campaigns.

Third, how different knowledge sources interact can ultimately affect their impact on individuals' views on intimate partner violence. While much of the existing literature notes that a combination of interventions is needed to produce behaviour change, this study indicates that which interventions are combined is an important consideration that can substantially affect results.

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APPENDIX A

Ethics Approval



The Ottawa Hospital | L'Hôpital
d'Ottawa

Research Ethics Board
Conseil d'éthique en recherches
798-5555 ext 14146, 14902 or 15072
Fax No. ~ 761-4311
<http://www.ohri.ca/ohreb/>

Monday, May 26, 2008

Dr. George Wells
University of Ottawa Heart Institute

Dear Dr. Wells:

RE: Protocol# - 2007278-01H Links Between Source of Knowledge About HIV and Views on Sexual Violence and Self-Perceived Risk of HIV Infection in Southern Africa

Renewal Expiry Date - Wednesday, June 10, 2009

I am pleased to inform you that your Annual Renewal Request (listed above) was reviewed by the Ottawa Hospital Research Ethics Board (OHREB) and is approved. No changes, amendments or addenda may be made in the protocol or the consent form without the OHREB's review and approval.

Renewal is valid for a period of one year. Approximately one month prior to that time, a single renewal form should be sent to the OHREB office.

The Tri-Council Policy Statement requires a greater involvement of the OHREB in studies over the course of their execution. As well, you must inform the Board of adverse events encountered during the study, here or elsewhere, or of significant new information which becomes available after the Board review, either of which may impinge on the ethics of continuing the study. The OHREB will review the new information to determine if the protocol should be modified, discontinued, or should continue as originally approved.

Yours sincerely,

Raphael Saginur, M.D.
Chairman
Ottawa Hospital Research Ethics Board

Encl.

/jm



The Ottawa Hospital | L'Hôpital
d'Ottawa

Research Ethics Board
Conseil d'éthique en recherches
798-5555 ext 14146, 14902 or 15072
Fax No. ~ 761-4311
<http://www.ohri.ca/ohreb/>

Monday, May 26, 2008

Dr. George Wells
University of Ottawa Heart Institute

Dear Dr. Wells,

**RE: Protocol# - 2007278-01H Links Between Source of Knowledge About HIV and Views on Sexual
Violence and Self-Perceived Risk of HIV Infection in Southern Africa**

Expiry Date - Wednesday, June 10, 2009

The new hospital policy on "Confidentiality and Security of Hospital Patient Records and Patient Specific Information" (RM-2) requires that individuals accessing information in patient files for research purposes must provide an application for review of patient record and patient information.

Attached is the "Application for Review" form with your:

1. Research Protocol Number
2. Research Protocol Title
3. Validation Date

You will be required to complete the following information:

1. The name of the individual requiring access
2. Your signature
3. If you will be reviewing charts, please ensure that the costing sheet which is part of the revised OHREB application, has been completed.

These forms must be forwarded to the Director of the Health Records Department prior to initiating your review. The Application for Review of Patient (Clinical) Record(s) has been signed by myself on behalf of the Vice-President, Academic and Research.

When access to patient files is required, you must supply a list of the patient names to Health Records.

For your information we have also enclosed pages 24/25 of the hospital policy: pages which pertain to research requests for access to patient information. Additional copies of this form are available upon request from the Ottawa Hospital Research Ethics Board office, Civic Parkdale Clinic, 6th Floor, Room 615, Civic Campus.

Yours sincerely,

Mary Ann Laviolette
Ethics Coordinator
Ottawa Hospital Research Ethics Board

**Ottawa Hospital
Health Data and Information Service
Health Records Department**

**Application for Review of Patient (Clinical) Record(s)
and
Patient Information**

Research Protocol No.: **2007278-01H**
(Please refer to protocol
number on all inquiries)

Date: **Monday, May 26, 2008**

Phone: **6137985555**

Protocol Title: **Links Between Source of Knowledge About HIV and Views on Sexual Violence
and Self-Perceived Risk of HIV Infection in Southern Africa**

Protocol Validation Date: **Wednesday, June 10, 2009**

Reason for Review: _____

Years to be reviewed: _____

Is The Study Funded? ☒ No ☐ Yes Source: _____

Principal Investigator: **Dr. George Wells**

Signature of Investigator: _____

Research Assistant (if applicable): _____

ALL REVIEWS MUST BE SPONSORED BY THE CLINICAL CHIEF OF THE DEPARTMENT OR DIVISION
UNDER REVIEW, OR THE RESPONSIBLE VICE-PRESIDENT FOR ADMINISTRATIVE REVIEW, OR THE
ETHICS CO-ORDINATOR FOR THE VICE-PRESIDENT ACADEMIC AND RESEARCH.

Chief of Division or Department

Ethics Co-ordinator

Health Records Analyst

Source Used

MedRecs Selection

Sponsor Signature: _____

Date: _____ Name: _____

Title: _____

IF ACCESS TO RADIOLOGY/NUCLEAR MEDICINE FILMS ARE REQUIRED, PLEASE PRESENT
COMPLETED COPY OF THIS FORM TO THE APPROPRIATE FILM LIBRARY, RADIOLOGY C1 OR
NUCLEAR MEDICINE OCF 2.

Ottawa Hospital Research Chart Review Policy

Reviews will be conducted by members of the Ottawa Hospital Medical/Dental Staff, House Staff or research assistants working for the medical staff. Projects to be conducted by external groups will be sponsored by the Chief of the Clinical Department/Division under review. If patient contact is required for the study, this must be stated in the application. If the review is being conducted in preparation for publication, the permission of the attending physician must be secured.

DUE TO THE SPACE LIMITATIONS AND THE NEED FOR CHART CONTROL, RECORDS CAN ONLY BE OUT OF FILE FOR 3 WEEKS. IF REVIEW HAS NOT BEGUN BY THIS TIME, THE PRINCIPAL INVESTIGATOR WILL BE CONTACTED AND THE CHARTS RETURNED.

Confidentiality

The hospital records which you will be reviewing contain information, which patients have the right to expect, will be held in confidence. Please review the following items concerning confidentiality and research and sign the Statement of Understanding.

Charts retrieved for review will be stored and used in the Health Records Department where access can be controlled.

Health data which is abstracted for research or educational purposes must be collected in an unidentifiable format. A unique identifier, unlinkable with any other non-health data system is recommended.

All working papers generated by the review will be stored in a secure area and will be shredded when they are no longer useful.

Statement of Understanding

I have read the policy on confidentiality and research.

I understand that all health information which I may have access to is confidential and is to be dealt with in keeping with the OH policy on Confidentiality and Security (ADM-31).

SIGNED:

Principal Investigator

Research Assistant

MEDICAL AUDIT

IT IS POSSIBLE THAT THE STUDY OF THESE RECORDS MAY ENABLE YOU TO MAKE A REPORT TO THE MEDICAL AUDIT AND TISSUE REVIEW COMMITTEE REGARDING THE QUALITY OF CARE OF THIS GROUP OF PATIENTS. IF YOU REQUIRE ASSISTANCE IN THE DESIGN OF SUCH A REPORT, PLEASE CONTACT THE CHAIRMAN OF THE MEDICAL AUDIT AND TISSUE REVIEW COMMITTEE.

APPENDIX B

Systematic Review Search Strategy and Results

- 1 Domestic Violence/ (8095)
- 2 Battered Women/ (4238)
- 3 Spouse Abuse/ (9108)
- 4 Rape/ (10744)
- 5 Violence/ (49967)
- 6 intimate partner violence.tw. (2895)
- 7 sexual violence.tw. (1614)
- 8 1 and 2 and 3 and 4 and 5 and 6 and 7 (0)
- 9 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 (74680)
- 10 Developing Countries/ (120523)
- 11 Africa, Western/ or Africa, Central/ or "Africa South of the Sahara"/ or Africa/ or Africa, Northern/ or South Africa/ or Africa, Eastern/ or Africa, Southern/ (114104)
- 12 Asia, Central/ or Asia/ or Asia, Western/ or Asia, Southeastern/ (50725)
- 13 americas/ or caribbean region/ or central america/ or latin america/ or south america/ (43177)
- 14 11 and 13 and 10 and 12 (849)
- 15 11 or 13 or 10 or 12 or 14 (269451)
- 16 9 and 15 (2381)
- 17 limit 16 to english language [Limit not valid in CCTR,CDSR; records were retained] (2270)
- 18 Tertiary Prevention/ or Secondary Prevention/ or Primary Prevention/ (47561)
- 19 incidence/ or prevalence/ (684196)
- 20 Attitude to Health/ or Attitude/ or Attitude to Death/ (222388)
- 21 Behavior/ (102155)
- 22 18 or 19 or 20 or 21 (1038008)
- 23 22 and 17 (662)
- 24 limit 23 to english language [Limit not valid in CCTR,CDSR; records were retained] (662)
- 25 Randomized Controlled Trial/ or Clinical Trial, Phase I/ or Clinical Trial, Phase IV/ or Clinical Trial/ or Clinical Trial, Phase III/ or Clinical Trial, Phase II/ or Controlled Clinical Trial/ (1441740)
- 26 stud\$.tw. (10903190)
- 27 25 and 26 (864044)
- 28 25 or 26 (11480886)
- 29 28 and 24 (267)
- 30 limit 29 to english language [Limit not valid in CCTR,CDSR; records were retained] (267)
- 31 from 30 keep 1-127 (127)
- 32 from 30 keep 4,8,14,17-18,31,39,55,71 (9)
- 33 limit 24 to (clinical trial, all or clinical trial or controlled clinical trial or evaluation studies or multicenter study or randomized controlled trial) [Limit not valid in EMBASE,CCTR,CDSR; records were retained] (131)
- 34 remove duplicates from 33 (123)
- 35 from 34 keep 1-123 (123)

APPENDIX C

Systematic Review Data Collection Form

Study

Name:

Author(s):

Reviewer(s):

Study I.D.:

Eligibility

Confirmation of eligibility:

Reason for exclusion:

Methods

Study design:

Study duration:

Allocation concealment:

Blinding:

Other bias concerns:

Participants

Total number:

Setting:

Age:

Sex:

Country:

Interventions

Total # of intervention groups:

Specific intervention:

Outcomes

Outcomes and time points:

Outcome definition:

Unit of measurement:

Results

of participants in ea. Intervention group:

For each outcome

sample size:

missing participants:

estimate of effect with CI and p-value:

Subgroup analyses:

Miscellaneous

Funding source:

Key conclusions of study authors:

References of relevant studies:

Reviewer comments:

APPENDIX D

EPHPP *Quality Assessment Tool for Quantitative Studies*

QUALITY ASSESSMENT TOOL FOR QUANTITATIVE STUDIES

COMPONENT RATINGS

Ref ID: _____
 Author: _____
 Year: _____
 Reviewer: _____

A) SELECTION BIAS

(Q1) Are the individuals selected to participate in the study likely to be representative of the target population?

Very Likely Somewhat Likely Not Likely

(Q2) What percentage of selected individuals agreed to participate?

80 - 100% Agreement 60 - 79% Agreement Less than 60% Agreement Not Reported Not Applicable

Rate this section (see dictionary)	Strong	Moderate	Weak
------------------------------------	--------	----------	------

B) ALLOCATION BIAS

Indicate the study design

RCT (go to i) Quasi-Experimental (go to C) Case-control, Before/After study, No control group, or Other: _____
 (Score Weak and go to C)

- | | | | |
|-------|---|-----|----|
| (i) | Is the method of random allocation stated? | Yes | No |
| (ii) | If the method of random allocation is stated is it appropriate? | Yes | No |
| (iii) | Was the method of random allocation reported as concealed? | Yes | No |

Rate this section (see dictionary)	Strong	Moderate	Weak
------------------------------------	--------	----------	------

C) CONFOUNDERS

(Q1) Prior to the intervention were there between group differences for important confounders reported in the paper?

Yes No Can't Tell Not Applicable
 (Score Weak and go to D)

Please refer to your Review Group list of confounders.

Relevant Confounders reported in the study:

_____	_____	_____
_____	_____	_____
_____	_____	_____

(Q2) If there were differences between groups for important confounders, were they adequately managed in the analysis?

Yes No Not Applicable

(Q3) Were there important confounders not reported in the paper?

Yes No

Relevant Confounders NOT reported in the study:

Rate this section (see dictionary)	Strong	Moderate	Weak
------------------------------------	--------	----------	------

Note: Many studies report the results of multiple data collection tools. If you are interested in only one outcome of interest, measured by one tool, at one point in time, rate the components (validity and reliability of tool, blinding, withdrawals and drop-outs) based on that one tool. If you are collecting multiple outcomes of interest, scored by multiple tools (e.g. self-report AND assessor interview, SF-36 AND made-up questionnaire), at multiple points in time (e.g. 6-month follow-up AND 20-year follow-up) copy components of the EPHPP tool so that each data collection tool of interest is scored.

D) BLINDING

(Q1) Was (were) the outcome assessor(s) blinded to the intervention or exposure status of participants?

Yes No Not Reported Not Applicable

Rate this section (see dictionary)	Strong	Weak	Not Applicable
------------------------------------	--------	------	----------------

E) DATA COLLECTION METHODS

(Q1) Were data collection tools shown or are they known to be valid?

Yes No

(Q2) Were data collection tools shown or are they known to be reliable?

Yes No

Rate this section (see dictionary)	Strong	Moderate	Weak
------------------------------------	--------	----------	------

F) WITHDRAWALS AND DROP-OUTS

(Q1) Indicate the percentage of participants completing the study. (If the percentage differs by groups, record the lowest).

80 -100% 60 - 79% Less than 60% Not Reported Not Applicable

Rate this section (see dictionary)	Strong	Moderate	Weak	Not Applicable
------------------------------------	--------	----------	------	----------------

G) ANALYSIS

(Q1) Is there a sample size calculation or power calculation?

Yes Partially No

(Q2) Is there a statistically significant difference between groups?

Yes No Not Reported

(Q3) Are the statistical methods appropriate?

Yes No Not Reported

(Q4a) Indicate the unit of allocation (circle one)

Community Organization/
Institution Group Provider Client

(Q4b) Indicate the unit of analysis (circle one)

Community Organization/
Institution Group Provider Client

(Q4c) If 4a and 4b are different, was the cluster analysis done?

Yes No Not Applicable

(Q5) Is the analysis performed by intervention allocation status (i.e. intention to treat) rather than the actual intervention received?

Yes No Can't Tell

H) INTERVENTION INTEGRITY

(Q1) What percentage of participants received the allocated intervention or exposure of interest?

80 -100% 60 - 79% Less than
60% Not Reported Not
Applicable

(Q2) Was the consistency of the intervention measured?

Yes No Not reported Not Applicable

(Q3) Is it likely that subjects received an unintended intervention (contamination or cointervention) that may influence the results?

Yes No Can't tell

SUMMARY OF COMPONENT RATINGS

Please transcribe the information from the gray boxes on pages 1-3 onto this page.

A SELECTION BIAS

Rate this section (see dictionary)	Strong	Moderate	Weak
------------------------------------	--------	----------	------

B STUDY DESIGN

Rate this section (see dictionary)	Strong	Moderate	Weak
------------------------------------	--------	----------	------

C CONFOUNDERS

Rate this section (see dictionary)	Strong	Moderate	Weak
------------------------------------	--------	----------	------

D BLINDING

Rate this section (see dictionary)	Strong	Weak	Not Applicable
------------------------------------	--------	------	----------------

E DATA COLLECTION METHODS

Rate this section (see dictionary)	Strong	Moderate	Weak
------------------------------------	--------	----------	------

F WITHDRAWALS AND DROPOUTS

Rate this section (see dictionary)	Strong	Moderate	Weak	Not Applicable
------------------------------------	--------	----------	------	----------------

G ANALYSIS

Comments _____

—

—

H INTERVENTION INTEGRITY

Comments _____

—

—

WITH BOTH REVIEWERS DISCUSSING THE RATINGS:

Is there a discrepancy between the two reviewers with respect to the component ratings?

No Yes

If yes, indicate the reason for the discrepancy

1
Oversight

2
Differences in
Interpretation of Criteria

3
Differences in
Interpretation of Study

DICTIONARY

for the
Effective Public Health Practice Project
Quality Assessment Tool for Quantitative Studies

INTRODUCTION

The purpose of this tool is to assess the methodological quality of relevant studies since lesser quality studies may be biased and could over-estimate or under-estimate the effect of an intervention. Each of two raters will independently assess the quality of each study and complete this form. When each rater is finished, the individual ratings will be compared. A consensus must be reached on each item. In cases of disagreement even after discussion, a third person will be asked to assess the study.

When appraising a study, it is helpful to first look at the design then assess other study methods. It is important to read the methods section since the abstract (if present) may not be accurate. Descriptions of items and the scoring process are located in the dictionary that accompanies this tool.

The scoring process for each component is located on the last page of the dictionary.

INSTRUCTIONS FOR COMPLETION

Circle the appropriate response in each component section (A-H). Component sections (A-F) are each rated using the roadmap on the last page of the dictionary. After each individual rater has completed the form, both reviewers must compare their ratings and arrive at a consensus.

The dictionary is intended to be a guide and includes explanations of terms.

The purpose of this dictionary is to describe items in the tool thereby assisting raters to score study quality. Due to under-reporting or lack of clarity in the primary study, raters will need to make judgements about the extent that bias may be present. When making judgements about each component, raters should form their opinion based upon information contained in the study rather than making inferences about what the authors intended.

A) SELECTION BIAS

Selection bias occurs when the study sample does not represent the target population for whom the intervention is intended. Two important types of biases related to sample selection are referral filter bias and volunteer bias. For example, the results of a study of participants suffering from asthma from a teaching hospital are not likely to be generalizable to participants suffering from asthma from a general practice. In volunteer bias, people who volunteer to be participants may have outcomes that are different from those of non-volunteers. Volunteers are usually healthier than non-volunteers.

Q1 Are the individuals selected to participate in the study likely to be representative of the target population?

The authors have done everything reasonably possible to ensure that the target population is represented (e.g.	Very Likely
Participants may not be representative if they are referred from a source within a target population even if it is in a systematic manner (e.g. patients from a teaching hospital for adults with asthma, only inner-city schools for adolescent risk.	Somewhat Likely

Participants are probably not representative if they are self-referred or are volunteers (e.g. volunteer patients from a teaching hospital for adults with asthma, inner-city school children with parental consent for adolescent risk) or if you can not tell.	Not Likely
--	------------

Q2 What percentage of selected individuals agreed to participate?

The % of subjects in the control and intervention groups that agreed to participate in the study before they were assigned to intervention or control groups.	%
There is no mention of how many individuals were approached to participate.	Not Reported
The study was directed at a group of people in a specific geographical area, city, province, broadcast audience, where the denominator is not known, e.g. mass media intervention.	Not Applicable

B) ALLOCATION BIAS

In this section, raters assess the likelihood of bias due to the allocation process in an experimental study. For observational studies, raters assess the extent that assessments of exposure and outcome are likely to be independent. Generally, the type of design is a good indicator of the extent of bias. In stronger designs, an equivalent control group is present and the allocation process is such that the investigators are unable to predict the sequence.

Q1 Indicate the study design.

Investigators randomly allocate eligible people to an intervention or control group.	RCT
<i>Cohort (two group pre and post)</i> Groups are assembled according to whether or not exposure to the intervention has occurred. Exposure to the intervention may or may not be under the control of the investigators. Study groups may not be equivalent or comparable on some feature that affects the outcome.	Two-group Quasi- Experimental
<i>Before/After Study (one group pre + post)</i> The same group is pretested, given an intervention, and tested immediately after the intervention. The intervention group, by means of the pretest, act as their own control group.	Case-control, Before/After Study or No Control Group
<i>Case control study</i> A retrospective study design where the investigators gather 'cases' of people who already have the outcome of interest and 'controls' that do not. Both groups are then questioned or their records examined about whether they received the intervention exposure of interest.	
<i>No Control Group</i>	

Note: The following questions are not for rating but for additional statistics that can be incorporated in the writing of the review.

(i) **If the study was reported as an RCT was the method of random allocation stated?**

The method of allocation was stated.	YES
The method of allocation was not stated.	NO

(ii) **Is the method of random allocation appropriate?**

The method of random allocation is appropriate if the randomization sequence allows each study participant to have the same chance of receiving each intervention and the investigators could not predict which intervention was next. e.g. an open list of random numbers of assignments or coin toss	YES
The method of random allocation is not entirely transparent, e.g. the method of randomization is described as alternation, case record numbers, dates of birth, day of the week	NO

(iii) **Was the method of random allocation concealed?**

The randomization allocation was concealed so that each study participant had the same chance of receiving each intervention and the investigators could not predict which group assignment was next. Examples of appropriate approaches include assignment of subjects by a central office unaware of subject characteristics, or sequentially numbered, and sealed in opaque envelopes.	YES
The method of random allocation was not concealed or not reported as concealed.	NO

C) CONFOUNDERS

A confounder is a characteristic of study subjects that:
is a risk factor (determinant) for the outcome to the putative cause, or
is associated (in a statistical sense) with exposure to the putative cause

Note: Potential confounders should be discussed within the Review Group and decided a priori.

Q1 Prior to the intervention were there differences for important confounders reported in the paper?

The authors reported that the groups were balanced at baseline with respect to confounders (either in the text or a table)	NO
The authors reported that the groups were not balanced at baseline with respect to confounders.	YES

Q2 Were the confounders adequately managed in the analysis?

Differences between groups for important confounders were controlled in the design (by stratification or matching) or in the analysis.	YES
No attempt was made to control for confounders.	NO

Q3 Were there important confounders not reported?

describe	YES
All confounders discussed within the Review Group were reported.	NO

D) BLINDING

The purpose of blinding the outcome assessors (who might also be the care providers) is to protect against detection bias.

Q1 Was (were) the outcome assessor(s) blinded to the intervention or exposure status of participants?

Assessors were described as blinded to which participants were in the control and intervention groups.	YES
Assessors were able to determine what group the participants were in.	NO
The data was self-reported and was collected by way of a survey, questionnaire or interview.	Not Applicable
It is not possible to determine if the assessors were blinded or not.	Not Reported

E) DATA COLLECTION METHODS

Some sources from which data may be collected are:

Self reported data includes data that is collected from participants in the study (e.g. completing a questionnaire, survey, answering questions during an interview, etc.).

Assessment/Screening includes objective data that is retrieved by the researchers. (e.g. observations by investigators).

Medical Records / Vital Statistics refers to the types of formal records used for the extraction of the data.

Reliability and validity can be reported in the study or in a separate study. For example, some standard assessment tools have known reliability and validity.

Q1 Were data collection tools shown or known to be valid for the outcome of interest?

The tools are known or were shown to measure what they were intended to measure.	YES
There was no attempt to show that the tools measured what they were intended to measure.	NO

Q2 Were data collection tools shown or known to be reliable for the outcome of interest?

The tools are known or were shown to be consistent and accurate in measuring the outcome of interest (e.g., test-retest, Cronback's alpha, interrater reliability).	YES
There was no attempt to show that the tools were consistent and accurate in measuring the outcome of interest.	NO

F) WITHDRAWALS AND DROP-OUTS

Q1 Indicate the percentage of participants completing the study.

The percentage of participants that completed the study.	%
--	---

The study was directed at a group of people in a specific geographical area, city, province, broadcast audience, where the percentage of participants completing, withdrawing or dropping-out of the study is not known, e.g. mass media intervention.	Not Applicable
The authors did not report on how many participants completed, withdrew or dropped-out of the study.	Not Reported

G) ANALYSIS

If you have questions about analysis, contact your review group leader.

- Q1. The components of a recognized formula are present. There's a citation for the formula used.
- Q2. The appropriate statistically significant difference between groups needs to be determined by the review group before the review begins.
- Q3. The review group leader needs to think about how much the study has violated the underlying assumptions of parametric analysis?
- Q5. Whether intention to treat or reasonably high response rate (may need to clarify within the review group).

H) INTERVENTION INTEGRITY

- Q1 **What percentage of participants received the allocated intervention or exposure of interest?**

The number of participants receiving the intended intervention is noted. For example, the authors may have reported that at least 80 percent of the participants received the complete intervention.	%
describe	Not Reported
describe	Not Applicable

Q2 Was the consistency of the intervention measured?

The authors should describe a method of measuring if the intervention was provided to all participants the same way.

describe	Yes
describe	No
describe	Not Reported

Q3 Is it likely that subjects received an unintended intervention (contamination or cointervention) that may influence the results?

The authors should indicate if subjects received an unintended intervention that may have influenced the outcomes. For example, co-intervention occurs when the study group receives an additional intervention (other than that intended). In this case, it is possible that the effect of the intervention may be over-estimated. Contamination refers to situations where the control group accidentally receives the study intervention. This could result in an under-estimation of the impact of the intervention.

describe	Yes
describe	No
describe	Can't Tell

Component Ratings for Study**A) SELECTION BIAS****Strong**

Q1 = Very Likely AND Q2 = 80-100% Agreement
 OR
 Q1 = Very Likely AND Q2 = Not Applicable

Moderate

Q1 = Very Likely AND Q2 = 60 - 79% Agreement
 OR
 Q1 = Very Likely AND Q2 = Not Reported
 OR
 Q1 = Somewhat Likely AND Q2 = 80-100%
 OR
 Q1 = Somewhat Likely AND Q2 = 60 - 79% Agreement
 OR
 Q1 = Somewhat Likely AND Q2 = Not Applicable

Weak

Q1 = Not Likely
 OR
 Q2 = Less than 60% agreement
 OR
 Q1 = Somewhat Likely AND Q2 = Not Reported

B) ALLOCATION BIAS**Strong**

Study Design = RCT

Moderate

Study Design = Two-Group Quasi-Experimental

Weak

Study Design = Case Control, Before/After Study, No Control Group

C) CONFOUNDERS**Strong**

Q1 = No	AND Q2 = N/A	AND Q3 = No
Q1 = Yes	AND Q2 = Yes	AND Q3 = No

Moderate

Q1 = Yes	AND Q2 = Yes	AND Q3 = Yes
----------	--------------	--------------

Weak

Q1 = Can't Tell		
Q1 = Yes	AND Q2 = No	AND Q3 = Yes
Q1 = Yes	AND Q2 = No	AND Q3 = No
Q1 = No	AND Q2 = N/A	AND Q3 = Yes

D) BLINDING**Strong**

Q1 = Yes

Weak

Q1 = No

Q1 = Not Reported

Not Applicable

E) DATA COLLECTION METHODS

Strong

Q1 = Yes AND Q2 = Yes

Moderate

Q1 = Yes AND Q2 = No

Weak

Q1 = No AND Q2 = Yes

OR

Q1 = No AND Q2 = No

F) WITHDRAWALS AND DROP-OUTS

Strong

Q1 = 80-100%

Moderate

Q1 = 60-79%

Weak

Q1 = Less than 60%

OR

Q1 = Not Reported

Not Applicable

APPENDIX E

EPHPP Tool Results

Criteria	Usdin	MAP	Fawole	Jewkes	Ross	Pronyk
Overall rating	MODERATE	WEAK	MODERATE	STRONG	STRONG	STRONG
A) Selection Bias	MODERATE	WEAK	MODERATE	STRONG	STRONG	STRONG
Q1) Are the individuals selected to participate in this study likely to be representative of the target population? (very likely; somewhat likely, not likely)	Very likely	Not likely	Very likely	Very likely	Very likely	Very likely
Q2) What percentage of individuals agreed to participate? (80-100%; 60-79%; less than 60%; not reported; not applicable)	Not reported	Not reported	94.50%	Not reported	Not reported	97%
B) Allocation bias	MODERATE	WEAK	WEAK	STRONG	STRONG	STRONG
Q1) Indicate the study design RCT (go to i) Quasi-experimental (go to C) Case-control, before/after study, no control group, or other: ____ (score Weak and go to C)	quasi-exp	quasi-exp	quasi-exp	RCT	RCT	RCT
i) is the method of random allocation stated? (yes; no)	before/after study	before/after study	before/after study	Yes	Yes	Yes
ii) Is the method of random allocation appropriate? (yes; no)				Yes	Yes	Yes
iii) Was the method of				No	No	No

Criteria	Usdin	MAP	Fawole	Jewkes	Ross	Pronyk
random allocation reported as concealed? (yes; no)						
C) Confounders						
Q1) Prior to the intervention were there between group differences for important confounders reported in the paper? (yes; no; can't tell; not applicable - score Weak and go to D)	STRONG Yes	WEAK Not applicable	WEAK Not applicable	STRONG Yes	STRONG Yes	STRONG Yes
Relevant confounders reported in the study:	Employment, general radio use			Education level	Sex, Ethnic group, Lifetime number of partners	intervention women more likely to be members of social groups and savings associations (p=0.01 & p=0.02), more likely to believe community would work together towards a common goal (p=0.06); more likely to report controlling behaviours by their partner (p=0.01)
Q2) If there were differences between groups for important confounders, were they adequately managed in the analysis? (yes; no; not applicable)	Yes			Yes	Yes	Yes
Q3) Were there important confounders not reported in the paper? (yes; no)	No			No	No	No
Relevant confounders not reported in the study:						
D) Blinding						
Q1) Was (were) the outcome assessor(s)	Not applicable	Not applicable	Not applicable	Yes for blood	Not reported	Yes

Criteria	Usdin	MAP	Fawole	Jewkes	Ross	Pronyk
blinded to the intervention or exposure status of participants? (yes; no; not reported; not applicable)				tests. Not reported for this review's outcome of interest		
E) Data collection methods	WEAK	WEAK	WEAK			STRONG
Q1) Were data collection tools shown or are they known to be valid? (yes; no)	No	No	No	Yes for primary outcome; No for outcome of interest	Yes for primary outcome; No for outcome of interest	Yes
Q2) Were data collection tools shown or are they known to be reliable? (yes; no)	No	No	No	Same as above	Same as above	Yes
F) Withdrawals and dropouts	Not applicable	MODERATE	Not applicable	STRONG	MODERATE	MODERATE
Q1) Indicate the percentage of participants completing the study. (If the percentage differs by groups, report the lowest) (80-100%; 60-79%; less than 60%; not reported; not applicable)	Not applicable	66%	Not applicable	84%	73%	68%
G) Analysis						
Q1) Is there a sample size calculation or power calculation? (yes; partially; no)	No	No	No	Yes	Yes	partially
Q2) Is there a statistically significant difference between groups? (yes; no; not reported)	Yes	Not reported	Yes	No	Yes	Yes
Q3) Are the statistical methods appropriate? (yes; no; not reported)	Yes	Not reported	Yes	Yes	Yes	Yes
Q4a) Indicate the unit of allocation (Community; Organization/Institution; Group; Provider; Client)	Community	Client	Group	Community	Community	Community
Q4b) Indicate the unit of analysis (Community; Organization/Institution; Group; Provider; Client)	Client	Client	Client	Individual	Individual	Individual
Q4c) If 4a and 4b are different, was the cluster analysis	Not applicable	Not applicable	Can't tell	Yes	Yes	Yes

Criteria	Usdin	MAP	Fawole	Jewkes	Ross	Pronyk
done? (yes; no; not applicable)						
Q5) Is the analysis performed by the intervention allocation status (i.e. intention to treat) rather than the actual intervention received? (yes; no; can't tell)	Can't tell	No	Can't tell	Yes	Can't tell	Can't tell
Comments:	chi-squares; regression analysis	only simple proportions calculated; no tests for significance				
H) Intervention integrity						
Q1) What percentage of participants received the allocation intervention or exposure of interest? (80-100%; 60-79%; less than 60%; not reported; not applicable)	Not applicable	100%	Not reported	80-100%	60-79%	100%
Q2) Was the consistency of the intervention measured? (yes; no; not reported; not applicable)	Not applicable	Not reported	Not reported	Not reported	Yes	Not reported
Q3) Is it likely that subjects received an unintended intervention (contamination or cointervention) that may influence the results? (yes; no; can't tell)	Can't tell	Can't tell	Can't tell	Can't tell	Can't tell	Can't tell

APPENDIX F

Soul City Regional Evaluation Phase 1 (SR1) Study Code Sheet

	SR2 QUESTION	SR2 VARIABLE	SR2 VARIABLE CODES
	Soul City Regional Cycle number	CYCLE	1 CYCLE 1 2 CYCLE 2
AREA	Rural/Urban/Capital designation	RURALURB	1 rural 2 urban 3 capital
COMMCODE	Community code	COMMCODE	RANGE 100 – 1030
NEWHH	Is this a new household?	NEWHH	1 Yes 2 No
RADIO (C1)	3. Is there a radio that works in this house?	Q3RADIO	1 Yes 2 No 8 D/K 9 Missing
		Q3RADIOB	1 Yes (1) 2 No (2,8)
TELE (C2)	4. Is there a television that works in this house?	Q4TELE	1 Yes 2 No 8 D/K 9 Missing
		Q4TELEB	1 Yes (1) 2 No (2,8)
INCOME (C3)	5. What is your total household income per month?	Q5INC	0 No income 9999996 "Greater than 9999995" 999997 Refused 999998 D/K 999999 Missing
		LOWINC	1 Higher than 25%ile 2 up to and including 25%ile
AGE (C4)	12. <Note age and sex of the interviewee>	Q12AGE	## (age in years) 98 d/k 99 missing
SEX (C5)	12. <Note age and sex of the interviewee>	Q12SEX	1 Male 2 Female 9 Missing
		Q12SEXB	1 Male (1) 2 Female (2)
EDUC (C6)	13. What is the last grade of education you have completed? [last class/grade completed]	Q13EDYOU	0 Never went to school 1 Primary incomplete 2 Primary complete 3 Secondary incomplete 4 Secondary complete 5 University incomplete 6 Technical diploma 7 University degree 8 Post graduate/doctor 95 "Refuse to answer" 96 "Non-formal education" 97 "No partner" 98 don't know 99 Missing
		CANREAD	1 "Above primary" (3-8) 2 "Primary or less" (0,1,2)
GIFT (Y1)	25. Men have the right to have sex with their girlfriends if they buy them gifts.	Q25GIFT	1 Strongly agree 2 Agree 3 No opinion 4 Disagree 5 Strongly disagree 8 D/K 9 Missing
		Q25GIFTB	1 Disagrees (4,5) 2 Agrees or no opinion (1,2,3,8)

OLDER (Y2)	26. It's okay for an older man to have sex with teenagers.	Q26OLDER	1 Strongly agree 2 Agree 3 No opinion 4 Disagree 5 Strongly disagree 8 D/K 9 Missing
		Q26OLDERB	1 Disagrees (4,5) 2 Agrees or no opinion (1,2,3,8)
REFUS (Y3)	27. Women have the right to refuse to have sex with their husbands or boyfriends.	Q27REFUS	1 Strongly agree 2 Agree 3 No opinion 4 Disagree 5 Strongly disagree 6 s/agree bfr/disagr husb 7 agree bfr/disagr husband 8 D/K 9 Missing
		Q27REFUSB	1 Agrees (1,2) 2 Disagrees or no opinion (3,4,5,6,7,8)
EXPECT (Y4)	28. It's okay for a man to expect sex without a condom.	Q28EXPECT	1 Strongly agree 2 Agree 3 No opinion 4 Disagree 5 Strongly disagree 6 s/agree bfr/disagr husb 7 agree bfr/disagr husband 8 D/K 9 Missing
		Q28EXPECTB	1 Disagrees (4,5) 2 Agrees or no opinion (1,2,3,6,7,8)
LOVE (Y5)	29. A person has to have sex with their boyfriend or girlfriend to show that they love them.	Q29LOVE	1 Strongly agree 2 Agree 3 No opinion 4 Disagree 5 Strongly disagree 8 D/K 9 Missing
		Q29LOVEB	1 Disagrees (4,5) 2 Agrees or no opinion (1,2,3,8)
FAULT (Y6)	30. If a woman gets raped it's her own fault.	Q30FAULT	1 Strongly agree 2 Agree 3 No opinion 4 Disagree 5 Strongly disagree 8 D/K 9 Missing
		Q30FAULTB	1 Disagrees (4,5) 2 Agrees or no opinion (1,2,3,8)
KNOW (Y7)	31. Forcing sex with someone you know is not rape.	Q31KNOW	1 Strongly agree 2 Agree 3 No opinion 4 Disagree 5 Strongly disagree 8 D/K 9 Missing
		Q31KNOWB	1 Disagrees (4,5) 2 Agrees or no opinion (1,2,3,8)
RAPE (Y8)	32. Forcing your partner to have sex is rape.	Q32RAPE	1 Strongly agree 2 Agree 3 No opinion 4 Disagree 5 Strongly disagree 8 D/K 9 Missing
		Q32RAPEB	1 Agrees (1,2)

2 Disagrees or no opinion (3,4,5,8)			
PRIV (Y9)	33. Violence between a man and a woman is a private matter in which others shouldn't interfere.	Q33PRIV	1 Strongly agree 2 Agree 3 No opinion 4 Disagree 5 Strongly disagree 8 D/K 9 Missing
		Q33PRIVB	1 Disagrees (4,5) 2 Agrees or no opinion (1,2,3,8)
BEAT (Y10)	34. Women sometimes deserve to be beaten.	Q34BEAT	1 Strongly agree 2 Agree 3 No opinion 4 Disagree 5 Strongly disagree 8 D/K 9 Missing
		Q34BEATB	1 Disagrees (4,5) 2 Agrees or no opinion (1,2,3,8)
ACCEPT (Y11)	35. In my culture it is acceptable for a man to beat his wife.	Q35ACCEPT	1 Strongly agree 2 Agree 3 No opinion 4 Disagree 5 Strongly disagree 8 D/K 9 Missing
		Q35ACCEPTB	1 Disagrees (4,5) 2 Agrees or no opinion (1,2,3,8)
RIGHT (Y12)	46. Do most of your friends feel men have the right to have sex with their girlfriends if they buy them gifts?	Q46RIGHT	1 Yes 2 No 3 Don't have friends 8 D/K 9 Missing
		Q46RIGHTB	1 No (2) 2 Yes/dk (1,8) Note: recoded "don't have friends" to dot for this one and the next few
COMREFUS (Y13)	47. Do most people in your community feel women have a right to refuse sex with their partners?	Q47REFUS	1 Yes 2 No 3 Don't have friends 8 D/K 9 Missing
		Q47REFUSB	1 Yes (2) 2 No/dk (1,8)
COMCONDOM (Y14)	48. Do most people in your community feel it's okay for a man to expect sex without a condom?	Q48CONDOM	1 Yes 2 No 3 Don't have friends 6 Expect from wife, but not from girlfriends 8 D/K 9 Missing
		Q48CONDOMB	1 No (2) 2 Yes/dk (1,6,8)
SERIO (Y15)	54. Is violence against women considered a serious problem in this community?	Q54SERIO	1 Yes 2 No 8 D/K 9 Missing
		Q54SERIOB	1 Yes (1) 2 No/dk (2,8)
DO (Y16)	55. Can your community do anything about violence against women?	Q55DO	1 Yes 2 No 8 D/K 9 Missing
		Q55DOB	1 Yes (1) 2 No/dk (2,8)

VIOL (Y17)	58. In the last year, how often did you talk with anyone about domestic violence?	Q58VIOL	0 Never 1 Seldom 2 Often/many times 3 Sometimes 8 D/K 9 Missing
		Q58VOFTB	1 Talked about it often (2) 2 Did not talk about it often (0,1,3)
		Q58VIOLB	1 Talked about it (1,2,3) 2 Did not talk about it (0)
HIST (C7)	60. In the last year, have you and your partner had violent arguments where your partner beat, kicked or slapped you?	Q60BEAT	1 Yes 2 No 3 "No partner" 6 N/A 7 Refused 8 D/K 9 Missing
		Q60BEATB	1 No (2) 2 Yes or dk (1,8) Note: recoded 3,6,7,9 to dot
PARTNER (C8)	91. Do you currently have a sexual partner?	Q91PARTNER	1 Yes 2 No 7 Refused 8 D/K 9 Missing
		Q91PARTNRB	1 Yes (1) 2 No or dk (2,8) Note: There's not really a "negative" for this one
SOURCE (X)	95. From who or where did you learn what you know about HIV/AIDS?	Q95LEARN	0 No one/nowhere 1 Clinic/Hospital/Doctor 2 School/Teacher 3 Family 4 TV 5 Radio 6 Friends/Neighbours 7 Book/Pamphlets/Newspaper/ Magazines 8 Workshops 9 Community meetings 10 Youth groups 11 Village campaigns 12 Church/Pastor 13 Workplace 14 Magazines (use code 7) 15 Video cassettes 16 Peer educators 17 NGOs 18 Other HIV positive people 19 Salvation Army 20 FLAS 21 TASC 22 CIET Interview 23 "PASTOR / CHURCH" (use code 12) 24 Extension workers 25 TCM 26 Health motivator/Aids facilitator 27 SHAPE 30 BLM/Banja La Mtsogolo 31 MACRO 32 NASO 33 NAPHAM 34 Banja Loyera 35 DAPP 36 WHO 37 Mangochi 38 Iguja 39 Paevista 40 Catholics in action 41 My future is my choice 42 United nations 43 Red cross 44 UNICEF

45 Nanawo
46 Women's organisation group
47 Aids awareness campaigns
48 Anti Aids club
49 Counselling
50 FACT
51 Support groups
52 Aids city council
98 D/K
99 Missing

APPENDIX G

Exploratory Factor Analysis Results

Mplus VERSION 5
MUTHEN & MUTHEN
04/20/2009 9:17 PM

INPUT INSTRUCTIONS

TITLE: EFA with IMPUTED DATA;

DATA:

FILE IS "C:\USERS\ALISON\THESIS 2008\IMPUTED DATASETS\READY FOR
MPLUS\names.TXT";
TYPE IS IMPUTATION;

VARIABLE:

NAMES ARE w1-w8 c1-c8 x1-x17 y1-y9;
CATEGORICAL ARE x1-x17;
USEVARIABLES w2 w5 w7 x1-x17;
WEIGHT IS w2;
STRATIFICATION IS w7;
CLUSTER IS w5;

ANALYSIS:

TYPE IS COMPLEX EFA 1 10;
ESTIMATOR = WLSMV;
ITERATIONS = 1000;
CONVERGENCE = 0.00005;
H1ITERATIONS = 2000;
H1CONVERGENCE = 0.0001;
COVERAGE = 0.11;
ROTATION = VARIMAX;

OUTPUT:

SAMPSTAT;

*** WARNING in Analysis command

The COVERAGE option is not available with this analysis.
COVERAGE will be ignored.

*** WARNING in Output command

SAMPSTAT option is the default for multiple imputation.

2 WARNING(S) FOUND IN THE INPUT INSTRUCTIONS

EFA with IMPUTED DATA;

SUMMARY OF ANALYSIS

Number of groups	1
Average number of observations	15768

Number of replications	
Requested	10
Completed	Varies

Number of dependent variables	17
Number of independent variables	0
Number of continuous latent variables	0

Observed dependent variables

Binary and ordered categorical (ordinal)

X1	X2	X3	X4	X5	X6
X7	X8	X9	X10	X11	X12
X13	X14	X15	X16	X17	

Variables with special functions

Stratification	W7
Cluster variable	W5
Weight variable	W2

Estimator	WLSMV
Rotation	VARIMAX
Type of rotation	ORTHOGONAL
Maximum number of iterations	1000
Convergence criterion	0.500D-04
Maximum number of steepest descent iterations	20
Optimization Specifications for the Exploratory Factor Analysis	
Rotation Algorithm	
Number of random starts	0
Maximum number of iterations	10000
Derivative convergence criterion	0.100D-04

Input data file(s)

Multiple data files from
C:\USERS\ALISON\THESIS 2008\IMPUTED DATASETS\READY FOR
MPLUS\names.TXT

Input data format FREE

SUMMARY OF DATA FOR THE FIRST REPLICATION

Number of strata	3
Number of clusters	213

SUMMARY OF CATEGORICAL DATA PROPORTIONS

X1	
Category 1	0.693
Category 2	0.307
X2	
Category 1	0.892
Category 2	0.108
X3	
Category 1	0.477
Category 2	0.523
X4	
Category 1	0.645
Category 2	0.355
X5	
Category 1	0.598
Category 2	0.402
X6	
Category 1	0.722
Category 2	0.278
X7	
Category 1	0.755
Category 2	0.245
X8	
Category 1	0.604
Category 2	0.396
X9	
Category 1	0.418
Category 2	0.582
X10	
Category 1	0.630
Category 2	0.370
X11	
Category 1	0.733
Category 2	0.267
X12	
Category 1	0.567

Category 2	0.433
X13	
Category 1	0.461
Category 2	0.539
X14	
Category 1	0.588
Category 2	0.412
X15	
Category 1	0.591
Category 2	0.409
X16	
Category 1	0.481
Category 2	0.519
X17	
Category 1	0.596
Category 2	0.404

SAMPLE STATISTICS FOR THE FIRST DATA SET

ESTIMATED SAMPLE STATISTICS

MEANS/INTERCEPTS/THRESHOLDS					
	X1\$1	X2\$1	X3\$1	X4\$1	X5\$1
1	0.505	1.236	-0.058	0.371	0.249

MEANS/INTERCEPTS/THRESHOLDS					
	X6\$1	X7\$1	X8\$1	X9\$1	X10\$1
1	0.590	0.689	0.263	-0.208	0.333

MEANS/INTERCEPTS/THRESHOLDS					
	X11\$1	X12\$1	X13\$1	X14\$1	X15\$1
1	0.622	0.169	-0.097	0.224	0.230

MEANS/INTERCEPTS/THRESHOLDS		
	X16\$1	X17\$1
1	-0.049	0.242

CORRELATION MATRIX (WITH VARIANCES ON THE DIAGONAL)

	X1	X2	X3	X4	X5
X1	0.372				
X2	0.013	-0.094			
X3	0.229	0.216	-0.061		
X4	0.545	0.240	0.039	0.326	
X5	0.320	0.287	0.021	0.233	0.338
X6	0.213	0.180	0.042	0.108	0.237
X7	0.043	0.002	0.213	0.053	0.108
X8	0.210	0.080	0.078	0.153	0.275
X9	0.272	0.238	0.062	0.145	0.277
X10	0.212	0.330	-0.049	0.145	0.194
X11	0.483	0.228	-0.003	0.150	0.314
X12	-0.056	-0.040	0.292	0.006	0.036
X13	0.136	0.139	-0.015	0.343	0.185
X14	-0.026	-0.031	0.022	0.007	-0.045
X15	0.036	-0.033	0.101	0.039	0.035
X16	-0.064	-0.077	-0.046	-0.069	-0.083
X17					

CORRELATION MATRIX (WITH VARIANCES ON THE DIAGONAL)

	X6	X7	X8	X9	X10
X7	0.270				
X8	-0.002	0.219			
X9	0.267	0.104	0.032		
X10	0.296	0.170	0.052	0.307	
X11	0.207	0.138	0.004	0.112	0.573
X12	0.200	0.131	0.028	0.128	0.178
X13	-0.032	-0.046	0.122	0.049	0.022
X14	0.086	0.052	0.077	0.067	0.042
X15	-0.122	-0.081	0.049	-0.085	-0.045
X16	0.023	0.007	0.103	0.102	0.062
X17	-0.154	-0.043	-0.053	-0.075	-0.126

CORRELATION MATRIX (WITH VARIANCES ON THE DIAGONAL)

	X11	X12	X13	X14	X15
X12	0.138				
X13	-0.014	-0.120			
X14	0.077	0.213	0.050		

X15	0.037	-0.031	0.105	0.014	
X16	0.023	0.013	0.085	0.020	0.558
X17	-0.049	-0.057	-0.030	-0.031	-0.244

CORRELATION MATRIX (WITH VARIANCES ON THE DIAGONAL)

	X16	X17
X17	-0.303	

Errors for replication with data file C:\USERS\ALISON\THESIS 2008\IMPUTED DATASETS\READY F

Errors for replication with data file C:\USERS\ALISON\THESIS 2008\IMPUTED DATASETS\READY F

Errors for replication with data file C:\USERS\ALISON\THESIS 2008\IMPUTED DATASETS\READY F

Errors for replication with data file C:\USERS\ALISON\THESIS 2008\IMPUTED DATASETS\READY F

Errors for replication with data file C:\USERS\ALISON\THESIS 2008\IMPUTED DATASETS\READY F

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Errors for replication with data file C:\USERS\ALISON\THESIS 2008\IMPUTED DATASETS\READY F

Errors for replication with data file C:\USERS\ALISON\THESIS 2008\IMPUTED DATASETS\READY F

RESULTS FOR EXPLORATORY FACTOR ANALYSIS

EIGENVALUES FOR SAMPLE CORRELATION MATRIX

	1	2	3	4	5
1	3.359	1.861	1.415	1.318	1.107

EIGENVALUES FOR SAMPLE CORRELATION MATRIX

	6	7	8	9	10
1	1.049	0.981	0.861	0.792	0.697

EIGENVALUES FOR SAMPLE CORRELATION MATRIX

	11	12	13	14	15
1	0.668	0.645	0.573	0.534	0.408

EIGENVALUES FOR SAMPLE CORRELATION MATRIX

	16	17
1	0.377	0.355

EXPLORATORY FACTOR ANALYSIS WITH 1 FACTOR(S):

Number of successful replications: 10

Chi-Square Test of Model Fit

Degrees of freedom	29
Mean	955.053
Std Dev	20.979
Number of successful computations	10

Proportions		Percentiles	
Expected	Observed	Expected	Observed
0.990	1.000	14.256	911.045
0.980	1.000	15.574	911.045
0.950	1.000	17.708	911.045
0.900	1.000	19.768	911.045
0.800	1.000	22.475	911.045
0.700	1.000	24.577	939.890
0.500	1.000	28.336	956.250
0.300	1.000	32.461	962.664
0.200	1.000	35.139	973.846
0.100	1.000	39.087	974.187
0.050	1.000	42.557	974.187
0.020	1.000	46.693	974.187
0.010	1.000	49.588	974.187

RMSEA (Root Mean Square Error Of Approximation)

Mean	0.045
Std Dev	0.001
Number of successful computations	10

Proportions		Percentiles	
Expected	Observed	Expected	Observed
0.990	1.000	0.044	0.045
0.980	0.900	0.044	0.045
0.950	0.900	0.044	0.045
0.900	0.900	0.044	0.045
0.800	0.900	0.045	0.045
0.700	0.700	0.045	0.045
0.500	0.600	0.045	0.045
0.300	0.300	0.045	0.045
0.200	0.300	0.045	0.045
0.100	0.100	0.046	0.045
0.050	0.000	0.046	0.045
0.020	0.000	0.046	0.045
0.010	0.000	0.046	0.045

Root Mean Square Residual

Mean	0.093
Std Dev	0.048
Number of successful computations	10

Proportions		Percentiles	
Expected	Observed	Expected	Observed

0.990	1.000	-0.019	0.093
0.980	1.000	-0.006	0.093
0.950	1.000	0.014	0.093
0.900	1.000	0.031	0.093
0.800	1.000	0.053	0.093
0.700	1.000	0.068	0.093
0.500	0.400	0.093	0.093
0.300	0.000	0.118	0.093
0.200	0.000	0.134	0.093
0.100	0.000	0.155	0.093
0.050	0.000	0.172	0.093
0.020	0.000	0.192	0.093
0.010	0.000	0.205	0.093

RESULTS AVERAGED OVER REPLICATIONS

ESTIMATED FACTOR LOADINGS

1

X1	-0.141
X2	-0.094
X3	-0.008
X4	-0.086
X5	-0.130
X6	-0.106
X7	-0.067
X8	-0.022
X9	-0.073
X10	-0.108
X11	-0.098
X12	-0.095
X13	0.002
X14	-0.059
X15	0.005
X16	-0.019
X17	0.035

ESTIMATED RESIDUAL VARIANCES

	X1	X2	X3	X4	X5
1	0.496	0.782	0.998	0.816	0.573

ESTIMATED RESIDUAL VARIANCES

	X6	X7	X8	X9	X10
1	0.720	0.889	0.988	0.869	0.712

ESTIMATED RESIDUAL VARIANCES

	X11	X12	X13	X14	X15
1	0.765	0.776	1.000	0.915	0.999

ESTIMATED RESIDUAL VARIANCES

	X16	X17
1	0.991	0.969

EXPLORATORY FACTOR ANALYSIS WITH 2 FACTOR(S):

Number of successful replications: 10

Chi-Square Test of Model Fit

Degrees of freedom	27
Mean	577.654
Std Dev	13.026
Number of successful computations	10

Proportions		Percentiles	
Expected	Observed	Expected	Observed
0.990	1.000	12.878	556.290
0.980	1.000	14.125	556.290
0.950	1.000	16.151	556.290
0.900	1.000	18.114	556.290
0.800	1.000	20.703	556.290
0.700	1.000	22.719	562.084
0.500	1.000	26.336	579.177
0.300	1.000	30.319	586.194
0.200	1.000	32.912	588.818
0.100	1.000	36.741	588.933
0.050	1.000	40.113	588.933
0.020	1.000	44.140	588.933
0.010	1.000	46.963	588.933

RMSEA (Root Mean Square Error Of Approximation)

Mean 0.036
Std Dev 0.000
Number of successful computations 10

Proportions		Percentiles	
Expected	Observed	Expected	Observed
0.990	1.000	0.036	0.037
0.980	1.000	0.036	0.037
0.950	1.000	0.036	0.037
0.900	1.000	0.036	0.037
0.800	0.700	0.036	0.037
0.700	0.600	0.036	0.036
0.500	0.500	0.036	0.036
0.300	0.300	0.036	0.036
0.200	0.300	0.036	0.036
0.100	0.100	0.036	0.036
0.050	0.100	0.036	0.036
0.020	0.000	0.037	0.036
0.010	0.000	0.037	0.036

Root Mean Square Residual

Mean 0.068
Std Dev 0.032
Number of successful computations 10

Proportions		Percentiles	
Expected	Observed	Expected	Observed
0.990	1.000	-0.007	0.068
0.980	1.000	0.002	0.068
0.950	1.000	0.015	0.068
0.900	1.000	0.027	0.068
0.800	1.000	0.041	0.068
0.700	1.000	0.052	0.068
0.500	0.600	0.068	0.069
0.300	0.000	0.085	0.069
0.200	0.000	0.096	0.069
0.100	0.000	0.110	0.069
0.050	0.000	0.122	0.069
0.020	0.000	0.135	0.069
0.010	0.000	0.144	0.069

RESULTS AVERAGED OVER REPLICATIONS

VARIMAX ROTATED LOADINGS

	1	2
X1	0.712	0.021
X2	0.472	-0.019
X3	0.014	0.157
X4	0.426	0.049
X5	0.653	0.041
X6	0.536	0.004
X7	0.339	-0.014
X8	0.091	0.154
X9	0.356	0.071
X10	0.531	0.074
X11	0.481	0.060
X12	0.478	-0.011
X13	-0.034	0.185
X14	0.289	0.038
X15	-0.103	0.660
X16	0.012	0.811
X17	-0.135	-0.364

ESTIMATED RESIDUAL VARIANCES

	X1	X2	X3	X4	X5
1	0.493	0.777	0.975	0.816	0.572

ESTIMATED RESIDUAL VARIANCES

	X6	X7	X8	X9	X10
1	0.713	0.885	0.968	0.868	0.712

ESTIMATED RESIDUAL VARIANCES

	X11	X12	X13	X14	X15
1	0.765	0.771	0.964	0.915	0.553

ESTIMATED RESIDUAL VARIANCES

	X16	X17
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1	0.342	0.849
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EXPLORATORY FACTOR ANALYSIS WITH 3 FACTOR(S):

Number of successful replications: 10

Chi-Square Test of Model Fit

Degrees of freedom		26	
Mean		430.799	
Std Dev		4.418	
Number of successful computations		10	
Proportions		Percentiles	
Expected	Observed	Expected	Observed
0.990	1.000	12.198	424.268
0.980	1.000	13.409	424.268
0.950	1.000	15.379	424.268
0.900	1.000	17.292	424.268
0.800	1.000	19.820	424.268
0.700	1.000	21.792	427.195
0.500	1.000	25.336	429.961
0.300	1.000	29.246	430.876
0.200	1.000	31.795	435.633
0.100	1.000	35.563	436.256
0.050	1.000	38.885	436.256
0.020	1.000	42.856	436.256
0.010	1.000	45.642	436.256

RMSEA (Root Mean Square Error Of Approximation)

Mean		0.031	
Std Dev		0.000	
Number of successful computations		10	
Proportions		Percentiles	
Expected	Observed	Expected	Observed
0.990	1.000	0.031	0.031
0.980	1.000	0.031	0.031
0.950	1.000	0.031	0.031
0.900	0.900	0.031	0.031
0.800	0.800	0.031	0.031
0.700	0.600	0.031	0.031

0.500	0.400	0.031	0.031
0.300	0.300	0.032	0.032
0.200	0.300	0.032	0.031
0.100	0.100	0.032	0.031
0.050	0.100	0.032	0.031
0.020	0.000	0.032	0.031
0.010	0.000	0.032	0.031

Root Mean Square Residual

Mean	0.056
Std Dev	0.025
Number of successful computations	10

Proportions		Percentiles	
Expected	Observed	Expected	Observed
0.990	1.000	-0.002	0.056
0.980	1.000	0.005	0.056
0.950	1.000	0.015	0.056
0.900	1.000	0.024	0.056
0.800	1.000	0.035	0.056
0.700	1.000	0.043	0.056
0.500	0.500	0.056	0.057
0.300	0.000	0.070	0.056
0.200	0.000	0.077	0.056
0.100	0.000	0.088	0.056
0.050	0.000	0.098	0.056
0.020	0.000	0.108	0.056
0.010	0.000	0.115	0.056

RESULTS AVERAGED OVER REPLICATIONS

VARIMAX ROTATED LOADINGS

	1	2	3
X1	0.726	0.175	0.009
X2	0.389	0.255	-0.020
X3	-0.019	0.056	0.160
X4	0.499	0.042	0.040
X5	0.650	0.191	0.035
X6	0.432	0.288	0.003
X7	0.284	0.167	-0.016
X8	0.092	0.024	0.153

X9	0.265	0.261	0.074
X10	0.161	0.911	0.116
X11	0.169	0.567	0.076
X12	0.519	0.087	-0.020
X13	-0.059	0.027	0.188
X14	0.380	-0.052	0.030
X15	-0.047	-0.117	0.661
X16	0.044	-0.048	0.807
X17	-0.113	-0.069	-0.363

ESTIMATED RESIDUAL VARIANCES

	X1	X2	X3	X4	X5
1	0.442	0.783	0.971	0.747	0.540

ESTIMATED RESIDUAL VARIANCES

	X6	X7	X8	X9	X10
1	0.731	0.891	0.968	0.856	0.131

ESTIMATED RESIDUAL VARIANCES

	X11	X12	X13	X14	X15
1	0.645	0.723	0.961	0.852	0.547

ESTIMATED RESIDUAL VARIANCES

	X16	X17
1	0.345	0.850

EXPLORATORY FACTOR ANALYSIS WITH 4 FACTOR(S):

Number of successful replications: 10

Chi-Square Test of Model Fit

Degrees of freedom	28
Mean	309.781
Std Dev	1.741
Number of successful computations	10

Proportions		Percentiles	
Expected	Observed	Expected	Observed
0.990	1.000	13.565	307.722
0.980	1.000	14.847	307.722
0.950	1.000	16.928	307.722
0.900	1.000	18.939	307.722
0.800	1.000	21.588	307.722
0.700	1.000	23.647	308.748
0.500	1.000	27.336	309.662
0.300	1.000	31.391	310.383
0.200	1.000	34.027	310.178
0.100	1.000	37.916	310.655
0.050	1.000	41.337	310.655
0.020	1.000	45.419	310.655
0.010	1.000	48.278	310.655

RMSEA (Root Mean Square Error Of Approximation)

Mean	0.025
Std Dev	0.000
Number of successful computations	10

Proportions		Percentiles	
Expected	Observed	Expected	Observed
0.990	1.000	0.025	0.025
0.980	1.000	0.025	0.025
0.950	1.000	0.025	0.025
0.900	0.900	0.025	0.025
0.800	0.800	0.025	0.025
0.700	0.700	0.025	0.025
0.500	0.500	0.025	0.025
0.300	0.100	0.025	0.025
0.200	0.100	0.025	0.025
0.100	0.100	0.025	0.025
0.050	0.100	0.025	0.025
0.020	0.100	0.025	0.025
0.010	0.000	0.025	0.025

Root Mean Square Residual

Mean	0.043
Std Dev	0.017
Number of successful computations	10

Proportions	Percentiles
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Expected	Observed	Expected	Observed
0.990	1.000	0.002	0.042
0.980	1.000	0.007	0.042
0.950	1.000	0.014	0.042
0.900	1.000	0.020	0.042
0.800	1.000	0.028	0.042
0.700	1.000	0.033	0.042
0.500	0.400	0.043	0.043
0.300	0.000	0.052	0.043
0.200	0.000	0.057	0.043
0.100	0.000	0.065	0.043
0.050	0.000	0.071	0.043
0.020	0.000	0.078	0.043
0.010	0.000	0.083	0.043

RESULTS AVERAGED OVER REPLICATIONS

VARIMAX ROTATED LOADINGS

	1	2	3	4
X1	0.719	0.182	-0.006	0.027
X2	0.385	0.286	-0.144	0.014
X3	-0.034	0.013	0.653	0.012
X4	0.499	0.046	-0.029	0.064
X5	0.659	0.180	0.147	0.002
X6	0.428	0.291	0.052	-0.021
X7	0.285	0.160	0.089	-0.049
X8	0.100	0.001	0.319	0.068
X9	0.268	0.244	0.166	0.011
X10	0.170	0.860	0.085	0.039
X11	0.154	0.626	-0.096	0.072
X12	0.519	0.094	-0.065	0.013
X13	-0.069	-0.005	0.413	0.081
X14	0.380	-0.051	-0.008	0.052
X15	-0.078	-0.062	0.010	0.759
X16	0.023	0.017	0.149	0.739
X17	-0.102	-0.100	-0.071	-0.361

ESTIMATED RESIDUAL VARIANCES

	X1	X2	X3	X4	X5
1	0.449	0.749	0.572	0.744	0.512

ESTIMATED RESIDUAL VARIANCES

	X6	X7	X8	X9	X10
1	0.728	0.883	0.884	0.841	0.223

ESTIMATED RESIDUAL VARIANCES

	X11	X12	X13	X14	X15
1	0.570	0.718	0.818	0.850	0.414

ESTIMATED RESIDUAL VARIANCES

	X16	X17
1	0.431	0.845

EXPLORATORY FACTOR ANALYSIS WITH 5 FACTOR(S):

Number of successful replications: 10

Chi-Square Test of Model Fit

Degrees of freedom	24
Mean	195.000
Std Dev	1.112
Number of successful computations	10

Proportions		Percentiles	
Expected	Observed	Expected	Observed
0.990	1.000	10.856	193.897
0.980	1.000	11.992	193.897
0.950	1.000	13.848	193.897
0.900	1.000	15.659	193.897
0.800	1.000	18.062	193.897
0.700	1.000	19.943	194.760
0.500	1.000	23.337	194.447
0.300	1.000	27.096	195.024
0.200	1.000	29.553	195.447
0.100	1.000	33.196	195.881
0.050	1.000	36.415	195.881
0.020	1.000	40.270	195.881

0.010 1.000 42.980 195.881

RMSEA (Root Mean Square Error Of Approximation)

Mean 0.021
 Std Dev 0.000
 Number of successful computations 10

Proportions		Percentiles	
Expected	Observed	Expected	Observed
0.990	1.000	0.021	0.021
0.980	1.000	0.021	0.021
0.950	1.000	0.021	0.021
0.900	1.000	0.021	0.021
0.800	0.800	0.021	0.021
0.700	0.700	0.021	0.021
0.500	0.400	0.021	0.021
0.300	0.200	0.021	0.021
0.200	0.100	0.021	0.021
0.100	0.100	0.021	0.021
0.050	0.100	0.021	0.021
0.020	0.100	0.021	0.021
0.010	0.100	0.021	0.021

Root Mean Square Residual

Mean 0.034
 Std Dev 0.013
 Number of successful computations 10

Proportions		Percentiles	
Expected	Observed	Expected	Observed
0.990	1.000	0.004	0.034
0.980	1.000	0.008	0.034
0.950	1.000	0.013	0.034
0.900	1.000	0.018	0.034
0.800	1.000	0.023	0.034
0.700	1.000	0.027	0.034
0.500	0.500	0.034	0.034
0.300	0.000	0.041	0.034
0.200	0.000	0.045	0.034
0.100	0.000	0.051	0.034
0.050	0.000	0.055	0.034
0.020	0.000	0.061	0.034
0.010	0.000	0.064	0.034

RESULTS AVERAGED OVER REPLICATIONS

VARIMAX ROTATED LOADINGS

	1	2	3	4	5
X1	0.804	0.046	-0.065	0.085	0.076
X2	0.367	0.264	-0.147	0.166	0.017
X3	0.034	-0.016	0.636	-0.100	0.022
X4	0.283	0.099	0.007	0.483	0.036
X5	0.640	0.106	0.117	0.200	0.023
X6	0.495	0.220	0.028	0.051	-0.001
X7	0.335	0.105	0.069	0.016	-0.032
X8	0.086	-0.006	0.320	0.058	0.067
X9	0.306	0.197	0.156	0.038	0.022
X10	0.295	0.781	0.095	-0.024	0.038
X11	0.169	0.673	-0.080	0.093	0.061
X12	0.498	0.029	-0.090	0.170	0.032
X13	-0.085	0.015	0.442	0.057	0.069
X14	0.120	0.007	0.062	0.639	0.012
X15	-0.137	-0.027	0.017	0.052	0.740
X16	0.019	0.008	0.139	-0.007	0.757
X17	-0.117	-0.079	-0.061	-0.008	-0.366

ESTIMATED RESIDUAL VARIANCES

	X1	X2	X3	X4	X5
1	0.334	0.746	0.583	0.675	0.524

ESTIMATED RESIDUAL VARIANCES

	X6	X7	X8	X9	X10
1	0.704	0.871	0.882	0.841	0.292

ESTIMATED RESIDUAL VARIANCES

	X11	X12	X13	X14	X15
1	0.500	0.713	0.789	0.573	0.430

ESTIMATED RESIDUAL VARIANCES

	X16	X17
1	0.407	0.842

EXPLORATORY FACTOR ANALYSIS WITH 6 FACTOR(S):

Number of successful replications: 10

Chi-Square Test of Model Fit

Degrees of freedom	21
Mean	114.767
Std Dev	1.756
Number of successful computations	10

Proportions		Percentiles	
Expected	Observed	Expected	Observed
0.990	1.000	8.897	109.827
0.980	1.000	9.915	109.827
0.950	1.000	11.591	109.827
0.900	1.000	13.240	109.827
0.800	1.000	15.445	109.827
0.700	1.000	17.182	114.810
0.500	1.000	20.337	114.982
0.300	1.000	23.858	115.151
0.200	1.000	26.171	115.348
0.100	1.000	29.615	115.951
0.050	1.000	32.671	115.951
0.020	1.000	36.343	115.951
0.010	1.000	38.932	115.951

RMSEA (Root Mean Square Error Of Approximation)

Mean	0.017
Std Dev	0.000
Number of successful computations	10

Proportions		Percentiles	
Expected	Observed	Expected	Observed
0.990	1.000	0.017	0.017
0.980	1.000	0.017	0.017
0.950	1.000	0.017	0.017
0.900	1.000	0.017	0.017
0.800	0.900	0.017	0.017

0.700	0.500	0.017	0.017
0.500	0.400	0.017	0.017
0.300	0.200	0.017	0.017
0.200	0.200	0.017	0.017
0.100	0.100	0.017	0.017
0.050	0.100	0.017	0.017
0.020	0.100	0.017	0.017
0.010	0.100	0.017	0.017

Root Mean Square Residual

Mean	0.026
Std Dev	0.009
Number of successful computations	10

Proportions		Percentiles	
Expected	Observed	Expected	Observed
0.990	1.000	0.005	0.025
0.980	1.000	0.008	0.025
0.950	1.000	0.011	0.025
0.900	1.000	0.014	0.025
0.800	1.000	0.018	0.025
0.700	1.000	0.021	0.025
0.500	0.500	0.026	0.026
0.300	0.000	0.030	0.026
0.200	0.000	0.033	0.026
0.100	0.000	0.037	0.026
0.050	0.000	0.040	0.026
0.020	0.000	0.043	0.026
0.010	0.000	0.046	0.026

RESULTS AVERAGED OVER REPLICATIONS

VARIMAX ROTATED LOADINGS

	1	2	3	4	5
X1	0.944	0.082	0.008	0.049	0.252
X2	0.296	0.255	-0.118	0.180	0.211
X3	0.003	-0.026	0.664	-0.112	0.074
X4	0.135	0.057	-0.018	0.550	0.238
X5	0.439	0.077	0.099	0.251	0.421
X6	0.165	0.102	-0.043	0.102	0.601
X7	0.161	0.070	0.043	0.053	0.308

X8	0.041	-0.005	0.316	0.072	0.068
X9	0.097	0.063	0.104	0.059	0.424
X10	0.134	0.500	0.072	0.000	0.417
X11	0.098	1.024	-0.038	0.076	0.120
X12	0.453	0.063	-0.047	0.191	0.174
X13	-0.075	0.014	0.442	0.040	-0.027
X14	0.118	0.021	0.072	0.590	0.016
X15	0.016	0.042	0.064	0.040	-0.254
X16	0.000	-0.008	0.127	-0.005	0.051
X17	-0.011	-0.023	-0.035	-0.022	-0.185

VARIMAX ROTATED LOADINGS

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X1	0.025
X2	0.001
X3	0.013
X4	0.045
X5	0.022
X6	0.023
X7	-0.024
X8	0.063
X9	0.042
X10	0.052
X11	0.033
X12	0.007
X13	0.065
X14	0.008
X15	0.748
X16	0.752
X17	-0.383

ESTIMATED RESIDUAL VARIANCES

	X1	X2	X3	X4	X5
1	0.035	0.757	0.540	0.617	0.551

ESTIMATED RESIDUAL VARIANCES

	X6	X7	X8	X9	X10
1	0.589	0.869	0.885	0.791	0.550

ESTIMATED RESIDUAL VARIANCES

	X11	X12	X13	X14	X15
1	-0.080	0.722	0.792	0.632	0.369

ESTIMATED RESIDUAL VARIANCES

	X16	X17
1	0.416	0.817

EXPLORATORY FACTOR ANALYSIS WITH 7 FACTOR(S):

Number of successful replications: 10

Chi-Square Test of Model Fit

Degrees of freedom	20
Mean	80.620
Std Dev	2.383
Number of successful computations	10

Proportions		Percentiles	
Expected	Observed	Expected	Observed
0.990	1.000	8.260	77.586
0.980	1.000	9.237	77.586
0.950	1.000	10.851	77.586
0.900	1.000	12.443	77.586
0.800	1.000	14.578	77.586
0.700	1.000	16.266	78.131
0.500	1.000	19.337	79.799
0.300	1.000	22.775	82.427
0.200	1.000	25.038	82.455
0.100	1.000	28.412	82.860
0.050	1.000	31.410	82.860
0.020	1.000	35.020	82.860
0.010	1.000	37.566	82.860

RMSEA (Root Mean Square Error Of Approximation)

Mean	0.014
Std Dev	0.000
Number of successful computations	10

Proportions		Percentiles	
Expected	Observed	Expected	Observed
0.990	1.000	0.014	0.014
0.980	1.000	0.014	0.014
0.950	1.000	0.014	0.014
0.900	0.900	0.014	0.014
0.800	0.800	0.014	0.014
0.700	0.500	0.014	0.014
0.500	0.400	0.014	0.014
0.300	0.400	0.014	0.014
0.200	0.200	0.014	0.014
0.100	0.100	0.014	0.014
0.050	0.100	0.014	0.014
0.020	0.000	0.014	0.014
0.010	0.000	0.014	0.014

Root Mean Square Residual

Mean	0.017
Std Dev	0.003
Number of successful computations	10

Proportions		Percentiles	
Expected	Observed	Expected	Observed
0.990	1.000	0.010	0.017
0.980	1.000	0.011	0.017
0.950	1.000	0.012	0.017
0.900	1.000	0.013	0.017
0.800	1.000	0.015	0.017
0.700	1.000	0.016	0.017
0.500	0.400	0.017	0.017
0.300	0.000	0.019	0.018
0.200	0.000	0.020	0.017
0.100	0.000	0.022	0.017
0.050	0.000	0.023	0.017
0.020	0.000	0.024	0.017
0.010	0.000	0.025	0.017

RESULTS AVERAGED OVER REPLICATIONS

VARIMAX ROTATED LOADINGS

1	2	3	4	5
_____	_____	_____	_____	_____

X1	0.987	0.092	0.002	0.048	0.162
X2	0.306	0.276	-0.126	0.189	0.120
X3	0.012	-0.030	0.636	-0.092	0.083
X4	0.152	0.067	-0.035	0.574	0.200
X5	0.463	0.096	0.082	0.268	0.353
X6	0.218	0.134	-0.058	0.122	0.497
X7	0.140	0.084	0.014	0.034	0.148
X8	0.033	-0.004	0.322	0.081	-0.015
X9	0.122	0.073	0.092	0.065	0.490
X10	0.157	0.544	0.069	0.005	0.409
X11	0.104	0.976	-0.036	0.079	0.062
X12	0.454	0.073	-0.060	0.195	0.123
X13	-0.070	0.009	0.460	0.051	0.008
X14	0.119	0.021	0.055	0.568	-0.003
X15	-0.009	0.031	0.057	0.032	-0.237
X16	0.000	-0.012	0.109	-0.005	0.072
X17	-0.031	-0.033	-0.025	-0.030	-0.169

VARIMAX ROTATED LOADINGS

	6	7
X1	0.027	0.051
X2	-0.002	0.115
X3	0.028	0.039
X4	0.043	0.047
X5	0.019	0.122
X6	0.014	0.183
X7	-0.020	0.799
X8	0.070	0.259
X9	0.039	0.001
X10	0.049	0.052
X11	0.035	0.039
X12	0.008	0.060
X13	0.069	-0.059
X14	0.013	0.016
X15	0.749	-0.050
X16	0.760	0.008
X17	-0.377	-0.038

ESTIMATED RESIDUAL VARIANCES

	X1	X2	X3	X4	X5
1	-0.015	0.750	0.577	0.598	0.558

ESTIMATED RESIDUAL VARIANCES

	X6	X7	X8	X9	X10
1	0.635	0.311	0.816	0.726	0.502

ESTIMATED RESIDUAL VARIANCES

	X11	X12	X13	X14	X15
1	0.022	0.728	0.772	0.659	0.375

ESTIMATED RESIDUAL VARIANCES

	X16	X17
1	0.405	0.824

EXPLORATORY FACTOR ANALYSIS WITH 8 FACTOR(S):

Number of successful replications: 10

Chi-Square Test of Model Fit

Degrees of freedom	17
Mean	40.295
Std Dev	0.792
Number of successful computations	10

Proportions		Percentiles	
Expected	Observed	Expected	Observed
0.990	1.000	6.408	38.998
0.980	1.000	7.255	38.998
0.950	1.000	8.672	38.998
0.900	1.000	10.085	38.998
0.800	1.000	12.002	38.998
0.700	1.000	13.531	39.860
0.500	1.000	16.338	39.927
0.300	1.000	19.511	40.672
0.200	1.000	21.615	40.880
0.100	1.000	24.769	40.987
0.050	1.000	27.587	40.987
0.020	1.000	30.995	40.987
0.010	1.000	33.409	40.987

RMSEA (Root Mean Square Error Of Approximation)

Mean 0.010
Std Dev 0.000
Number of successful computations 10

Proportions		Percentiles	
Expected	Observed	Expected	Observed
0.990	1.000	0.009	0.010
0.980	1.000	0.009	0.010
0.950	0.900	0.010	0.010
0.900	0.900	0.010	0.010
0.800	0.700	0.010	0.010
0.700	0.700	0.010	0.010
0.500	0.400	0.010	0.010
0.300	0.400	0.010	0.010
0.200	0.300	0.010	0.010
0.100	0.200	0.010	0.010
0.050	0.000	0.010	0.010
0.020	0.000	0.010	0.010
0.010	0.000	0.010	0.010

Root Mean Square Residual

Mean 0.011
Std Dev 0.001
Number of successful computations 10

Proportions		Percentiles	
Expected	Observed	Expected	Observed
0.990	1.000	0.008	0.011
0.980	1.000	0.008	0.011
0.950	1.000	0.009	0.011
0.900	1.000	0.009	0.011
0.800	1.000	0.010	0.011
0.700	1.000	0.010	0.011
0.500	0.600	0.011	0.011
0.300	0.000	0.012	0.011
0.200	0.000	0.012	0.011
0.100	0.000	0.013	0.011
0.050	0.000	0.013	0.011
0.020	0.000	0.014	0.011
0.010	0.000	0.014	0.011

RESULTS AVERAGED OVER REPLICATIONS

VARIMAX ROTATED LOADINGS

	1	2	3	4	5
X1	1.001	0.109	0.013	0.057	0.085
X2	0.285	0.302	-0.049	0.183	-0.125
X3	0.002	-0.038	0.245	-0.077	0.178
X4	0.143	0.079	-0.015	0.577	0.092
X5	0.456	0.113	0.073	0.280	0.250
X6	0.177	0.129	-0.035	0.110	0.266
X7	0.152	0.107	0.159	0.051	0.031
X8	0.014	0.010	0.549	0.087	-0.051
X9	0.132	0.106	0.032	0.097	0.500
X10	0.141	0.696	0.045	0.015	0.380
X11	0.105	0.792	-0.022	0.088	-0.021
X12	0.441	0.092	-0.011	0.217	0.072
X13	-0.073	0.007	0.594	0.046	0.045
X14	0.110	0.020	0.030	0.567	0.006
X15	-0.010	0.023	0.015	0.023	-0.184
X16	0.008	-0.011	0.062	0.004	0.116
X17	-0.023	-0.043	-0.019	-0.029	-0.088

VARIMAX ROTATED LOADINGS

	6	7	8
X1	0.148	0.010	0.025
X2	0.330	-0.023	-0.005
X3	-0.025	0.188	0.067
X4	0.170	-0.008	0.042
X5	0.254	0.043	0.022
X6	0.641	-0.017	0.033
X7	0.353	0.046	-0.028
X8	0.065	0.233	0.059
X9	0.138	0.022	0.038
X10	0.133	0.019	0.043
X11	0.116	-0.012	0.042
X12	0.097	-0.039	0.004
X13	-0.037	1.201	0.060
X14	-0.006	0.022	0.015
X15	-0.154	0.027	0.740
X16	-0.037	0.033	0.772
X17	-0.148	-0.009	-0.382

ESTIMATED RESIDUAL VARIANCES

	X1	X2	X3	X4	X5
1	-0.048	0.665	0.852	0.601	0.564

ESTIMATED RESIDUAL VARIANCES

	X6	X7	X8	X9	X10
1	0.455	0.776	0.369	0.690	0.327

ESTIMATED RESIDUAL VARIANCES

	X11	X12	X13	X14	X15
1	0.337	0.732	-1.732	0.664	0.392

ESTIMATED RESIDUAL VARIANCES

	X16	X17
1	0.382	0.821

EXPLORATORY FACTOR ANALYSIS WITH 9 FACTOR(S):

Number of successful replications: 10

Chi-Square Test of Model Fit

Degrees of freedom	11
Mean	16.037
Std Dev	0.539
Number of successful computations	10

Proportions		Percentiles	
Expected	Observed	Expected	Observed
0.990	1.000	3.053	15.419
0.980	1.000	3.609	15.419
0.950	1.000	4.575	15.419
0.900	1.000	5.578	15.419
0.800	1.000	6.989	15.419
0.700	1.000	8.148	15.586

0.500	1.000	10.341	15.687
0.300	1.000	12.899	16.535
0.200	1.000	14.631	16.190
0.100	0.000	17.275	16.404
0.050	0.000	19.675	16.404
0.020	0.000	22.618	16.404
0.010	0.000	24.725	16.404

RMSEA (Root Mean Square Error Of Approximation)

Mean	0.005
Std Dev	0.000
Number of successful computations	10

Proportions		Percentiles	
Expected	Observed	Expected	Observed
0.990	1.000	0.005	0.005
0.980	1.000	0.005	0.005
0.950	1.000	0.005	0.005
0.900	1.000	0.005	0.005
0.800	0.700	0.005	0.005
0.700	0.600	0.005	0.005
0.500	0.400	0.005	0.005
0.300	0.300	0.006	0.006
0.200	0.200	0.006	0.005
0.100	0.100	0.006	0.006
0.050	0.100	0.006	0.006
0.020	0.100	0.006	0.006
0.010	0.000	0.006	0.006

Root Mean Square Residual

Mean	0.007
Std Dev	0.001
Number of successful computations	10

Proportions		Percentiles	
Expected	Observed	Expected	Observed
0.990	1.000	0.003	0.007
0.980	1.000	0.004	0.007
0.950	1.000	0.004	0.007
0.900	1.000	0.005	0.007
0.800	1.000	0.006	0.007
0.700	1.000	0.006	0.007
0.500	0.500	0.007	0.007
0.300	0.000	0.008	0.007

0.200	0.000	0.008	0.007
0.100	0.000	0.009	0.007
0.050	0.000	0.009	0.007
0.020	0.000	0.010	0.007
0.010	0.000	0.010	0.007

RESULTS AVERAGED OVER REPLICATIONS

VARIMAX ROTATED LOADINGS

	1	2	3	4	5
X1	0.829	0.134	-0.007	0.057	-0.075
X2	0.315	0.323	-0.047	0.161	0.084
X3	0.012	-0.043	0.372	-0.081	-0.079
X4	0.138	0.088	-0.040	0.539	-0.087
X5	0.506	0.114	0.047	0.218	-0.190
X6	0.196	0.144	-0.009	0.096	-0.158
X7	0.161	0.110	-0.045	0.026	-0.034
X8	0.015	-0.002	0.131	0.065	0.000
X9	0.135	0.110	0.066	0.070	-0.281
X10	0.130	0.756	0.033	-0.004	-0.235
X11	0.113	0.736	-0.030	0.077	0.004
X12	0.565	0.082	-0.088	0.177	-0.031
X13	-0.075	0.016	0.826	0.064	0.008
X14	0.131	0.023	0.030	0.645	0.005
X15	-0.012	0.023	0.053	0.018	0.114
X16	0.003	-0.015	0.050	0.002	-0.068
X17	-0.031	-0.048	-0.018	-0.028	0.048

VARIMAX ROTATED LOADINGS

	6	7	8	9
X1	0.159	0.038	0.079	0.061
X2	0.313	-0.013	0.040	0.021
X3	-0.015	0.231	-0.050	-0.014
X4	0.160	0.026	0.141	0.115
X5	0.178	0.127	0.151	0.104
X6	0.669	0.005	-0.002	0.010
X7	0.302	0.327	0.034	0.015
X8	-0.015	0.698	0.020	0.036
X9	0.137	0.021	0.018	0.026
X10	0.093	0.067	-0.030	-0.004

X11	0.102	0.005	0.047	0.046
X12	0.062	0.030	-0.122	-0.071
X13	-0.019	0.009	0.077	0.071
X14	-0.004	0.044	-0.061	-0.035
X15	-0.153	-0.016	0.356	0.487
X16	-0.029	0.062	0.299	0.454
X17	-0.151	-0.027	-0.122	-0.209

ESTIMATED RESIDUAL VARIANCES

	X1	X2	X3	X4	X5
1	0.235	0.646	0.761	0.586	0.475

ESTIMATED RESIDUAL VARIANCES

	X6	X7	X8	X9	X10
1	0.415	0.752	0.487	0.712	0.235

ESTIMATED RESIDUAL VARIANCES

	X11	X12	X13	X14	X15
1	0.423	0.584	0.295	0.550	0.369

ESTIMATED RESIDUAL VARIANCES

	X16	X17
1	0.391	0.816

EXPLORATORY FACTOR ANALYSIS WITH 10 FACTOR(S):

Number of successful replications: 10

Chi-Square Test of Model Fit

Degrees of freedom	6
Mean	8.761
Std Dev	0.739
Number of successful computations	10
Proportions	Percentiles

Expected	Observed	Expected	Observed
0.990	1.000	0.872	7.910
0.980	1.000	1.134	7.910
0.950	1.000	1.635	7.910
0.900	1.000	2.204	7.910
0.800	1.000	3.070	7.910
0.700	1.000	3.828	7.969
0.500	1.000	5.348	8.415
0.300	1.000	7.231	9.141
0.200	0.100	8.558	9.348
0.100	0.000	10.645	9.463
0.050	0.000	12.592	9.463
0.020	0.000	15.033	9.463
0.010	0.000	16.812	9.463

RMSEA (Root Mean Square Error Of Approximation)

Mean	0.005
Std Dev	0.000
Number of successful computations	10

Proportions		Percentiles	
Expected	Observed	Expected	Observed
0.990	1.000	0.004	0.004
0.980	1.000	0.004	0.004
0.950	1.000	0.004	0.004
0.900	0.900	0.004	0.004
0.800	0.700	0.004	0.004
0.700	0.600	0.005	0.004
0.500	0.500	0.005	0.005
0.300	0.300	0.005	0.005
0.200	0.200	0.005	0.005
0.100	0.200	0.005	0.005
0.050	0.000	0.005	0.005
0.020	0.000	0.005	0.005
0.010	0.000	0.005	0.005

Root Mean Square Residual

Mean	0.005
Std Dev	0.001
Number of successful computations	10

Proportions		Percentiles	
Expected	Observed	Expected	Observed
0.990	1.000	0.004	0.005

0.980	1.000	0.004	0.005
0.950	1.000	0.004	0.005
0.900	1.000	0.004	0.005
0.800	1.000	0.005	0.005
0.700	1.000	0.005	0.005
0.500	0.400	0.005	0.005
0.300	0.000	0.006	0.005
0.200	0.000	0.006	0.005
0.100	0.000	0.006	0.005
0.050	0.000	0.006	0.005
0.020	0.000	0.007	0.005
0.010	0.000	0.007	0.005

RESULTS AVERAGED OVER REPLICATIONS

VARIMAX ROTATED LOADINGS

	1	2	3	4	5
X1	0.824	0.126	0.000	0.045	0.123
X2	0.303	0.301	-0.039	0.150	0.054
X3	0.019	-0.037	0.368	-0.073	-0.122
X4	0.134	0.084	-0.036	0.498	0.255
X5	0.496	0.105	0.048	0.190	0.308
X6	0.195	0.134	-0.008	0.086	0.007
X7	0.144	0.097	-0.048	0.021	0.036
X8	0.017	0.002	0.122	0.061	0.015
X9	0.131	0.108	0.065	0.065	0.020
X10	0.142	0.720	0.031	-0.004	-0.037
X11	0.105	0.774	-0.026	0.072	0.047
X12	0.564	0.080	-0.089	0.177	-0.143
X13	-0.082	0.015	0.823	0.058	0.079
X14	0.136	0.021	0.030	0.692	-0.086
X15	-0.008	0.036	0.066	0.021	0.086
X16	-0.002	-0.016	0.039	0.005	-0.086
X17	-0.038	-0.044	-0.021	-0.025	-0.002

VARIMAX ROTATED LOADINGS

	6	7	8	9	10
X1	0.190	0.025	-0.009	0.130	0.023
X2	0.362	-0.043	0.044	-0.098	-0.029
X3	-0.040	0.251	0.042	0.135	0.035

X4	0.169	0.016	0.035	0.150	0.025
X5	0.187	0.119	0.026	0.314	-0.009
X6	0.555	-0.016	0.157	0.320	-0.058
X7	0.358	0.313	-0.005	0.081	-0.039
X8	0.022	0.685	0.022	-0.013	0.055
X9	0.104	0.019	0.036	0.495	0.005
X10	0.067	0.071	0.108	0.388	-0.015
X11	0.139	-0.007	-0.015	-0.002	0.039
X12	0.057	0.034	0.051	0.067	-0.015
X13	-0.012	0.021	-0.004	-0.006	0.063
X14	0.000	0.046	0.006	0.002	0.008
X15	-0.124	0.004	0.203	-0.183	0.613
X16	0.036	0.065	0.084	0.174	0.948
X17	-0.091	-0.029	-0.535	-0.063	-0.253

ESTIMATED RESIDUAL VARIANCES

	X1	X2	X3	X4	X5
1	0.233	0.645	0.757	0.607	0.461

ESTIMATED RESIDUAL VARIANCES

	X6	X7	X8	X9	X10
1	0.497	0.732	0.507	0.704	0.286

ESTIMATED RESIDUAL VARIANCES

	X11	X12	X13	X14	X15
1	0.361	0.604	0.302	0.492	0.520

ESTIMATED RESIDUAL VARIANCES

	X16	X17
1	0.049	0.631

Beginning Time: 21:17:35

Ending Time: 21:19:51

Elapsed Time: 00:02:16

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APPENDIX H

Missing Data Patterns

Mplus VERSION 5
MUTHEN & MUTHEN
02/07/2008 5:10 PM

INPUT INSTRUCTIONS

TITLE: Missing data patterns;

DATA:

FILE IS "D:\Alison Riddle Thesis\17IPVoneperhouse.txt";

VARIABLE:

NAMES ARE a1 a2 w1 w2 a3 x1-x17 c1-c6;

CATEGORICAL ARE x1-x17;

USEVARIABLES ARE x1-x17;

MISSING ARE ALL (9);

ANALYSIS:

TYPE IS BASIC;

OUTPUT: SAMPSTAT;

*** WARNING

Data set contains cases with missing on all variables.

These cases were not included in the analysis.

Number of cases with missing on all variables: 98

1 WARNING(S) FOUND IN THE INPUT INSTRUCTIONS

Missing data patterns;

SUMMARY OF ANALYSIS

Number of groups	1
Number of observations	16609
Number of dependent variables	17
Number of independent variables	0
Number of continuous latent variables	0
Observed dependent variables	

Binary and ordered categorical (ordinal)

X1	X2	X3	X4	X5	X6
X7	X8	X9	X10	X11	X12
X13	X14	X15	X16	X17	

Estimator	WLSMV
Maximum number of iterations	1000
Convergence criterion	0.500D-04
Maximum number of steepest descent iterations	20
Maximum number of iterations for H1	2000
Convergence criterion for H1	0.100D-03
Parameterization	DELTA

Input data file(s)

D:\Alison Riddle Thesis\17IPVoneperhouse.txt

Input data format FREE

SUMMARY OF DATA

Number of missing data patterns	302
---------------------------------	-----

SUMMARY OF MISSING DATA PATTERNS

MISSING DATA PATTERNS (x = not missing)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
X1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X3	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X4	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X5	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X7	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X8	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X9	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X10	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X11	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X12	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X13	x	x	x	x	x	x	x	x	x	x	x	x	x	x						
X14	x	x	x	x	x	x	x	x						x	x	x	x	x		

X15	x	x	x	x		x	x	x		x	x	x		x		
X16	x	x		x	x		x	x		x	x		x	x		
X17	x		x		x		x	x	x		x		x	x	x	x

	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
X1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X3	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X4	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X5	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X7	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X8	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X9	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X10	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X11	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X12	x	x	x	x																
X13					x	x	x	x	x	x	x	x	x	x						
X14					x	x	x	x	x	x					x	x	x			
X15	x				x	x	x	x		x	x			x	x		x	x		
X16		x			x	x		x		x		x			x					
X17	x	x	x		x		x	x		x	x	x	x	x	x	x	x	x	x	x

	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
X1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X3	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X4	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X5	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X7	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X8	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X9	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X10	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X11	x	x	x	x																x
X12					x	x	x	x	x	x	x	x								x
X13					x	x	x	x	x	x		x	x	x						x
X14					x	x	x	x		x	x		x	x	x	x				x
X15	x				x	x	x		x		x	x			x	x		x		
X16		x			x	x		x	x	x	x		x	x	x		x	x		x
X17		x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
X1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X3	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

X4	x x x x x x x x x x x x x x x x x x x x
X5	x x x x x x x x x x x x x x x x x x x x
X6	x x x x x x x x x x x x x x x x x x x x
X7	x x x x x x x x x x x x x x x x x x x x
X8	x x x x x x x x x x x x x x x x x x x x
X9	x x x x x x
X10	x x x x x x x x x x x x
X11	x x x x x x x x x x x x x x
X12	x x x x x x x x x x
X13	x x x x x x x x x x x x
X14	x x x x x x x x x x x x
X15	x x x x x x x x x x x x
X16	x x x x x x x x x x
X17	x x x x x x x x x x x x x x

81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

X1	x x x x x x x x x x x x x x x x x x x x
X2	x x x x x x x x x x x x x x x x x x x x
X3	x x x x x x x x x x x x x x x x x x x x
X4	x x x x x x x x x x x x x x x x x x x x
X5	x x x x x x x x x x x x x x x x x x x x
X6	x x x x x x x x x x x x x x x x x x x x
X7	x x x x x x x x x x x x x x
X8	x x x x x x x x x x
X9	x x x x x x x x x x x x x x
X10	x x x x x x x x x x x x x x x x
X11	x x x x x x x x x x x x x x x x
X12	x x x x x x x x x x x x
X13	x x x x x x x x x x x x
X14	x x x x x x x x x x x x
X15	x x x x x x x x x x x x
X16	x x x x x x x x x x
X17	x x x x x x x x x x x x x x x x

101 102 103 104 105 106 107 108 109 110 111 112 113 114 115

X1	x x x x x x x x x x x x x x x x
X2	x x x x x x x x x x x x x x x x
X3	x x x x x x x x x x x x x x x x
X4	x x x x x x x x x x x x x x x x
X5	x x x x x x x x x x x x x x
X6	x x
X7	x x x x x x x x x x x x
X8	x x x x x x x x x x x x
X9	x x x x x x x x x x x x
X10	x x x x x x x x x x x x
X11	x x x x x x x x x x x x

X12	x	x			x		x	x	x	x	x		x	x	
X13	x	x	x	x		x		x		x	x	x		x	x
X14	x		x			x		x	x	x	x	x		x	x
X15		x	x	x		x	x		x	x	x	x		x	x
X16		x	x	x		x	x	x	x	x	x	x		x	
X17	x	x	x	x		x	x	x	x	x	x			x	x

116 117 118 119 120 121 122 123 124 125 126 127 128 129 130

X1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X3	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X4	x	x	x	x	x	x	x	x	x	x					
X5										x	x	x	x		
X6	x	x	x	x	x	x	x	x			x	x	x	x	
X7	x	x	x	x	x	x	x	x	x			x	x	x	x
X8	x	x	x	x	x	x	x	x	x			x	x	x	x
X9	x	x	x	x	x			x			x	x	x	x	
X10	x	x	x	x	x	x	x	x	x	x			x	x	x
X11	x	x	x	x		x	x	x	x	x			x	x	x
X12	x	x	x		x	x	x		x	x			x	x	x
X13	x	x	x		x	x	x	x	x	x			x	x	x
X14	x				x		x	x	x				x	x	x
X15		x	x	x	x		x	x	x	x			x	x	x
X16		x		x			x	x	x	x			x	x	
X17	x	x	x	x	x	x	x	x	x	x			x		x

131 132 133 134 135 136 137 138 139 140 141 142 143 144 145

X1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X3	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X4															
X5	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X7	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X8	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X9	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X10	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X11	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X12	x	x	x	x	x	x	x	x							
X13	x	x	x	x	x	x			x	x	x	x			
X14	x					x			x	x	x		x		
X15		x	x				x	x	x	x			x	x	x
X16		x		x	x		x	x	x				x	x	x
X17	x	x	x	x		x	x	x	x	x	x	x	x	x	x

146 147 148 149 150 151 152 153 154 155 156 157 158 159 160

X1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X3	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X4															
X5	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X7	x	x	x	x	x	x	x	x	x					x	x
X8	x	x	x	x	x	x	x				x	x	x	x	x
X9	x	x	x					x	x	x	x	x			x
X10	x	x		x	x	x		x	x	x	x	x		x	x
X11	x		x	x	x	x		x	x	x	x	x		x	x
X12		x		x	x	x		x	x	x	x	x	x	x	x
X13		x	x	x	x	x		x	x	x	x	x	x	x	x
X14		x	x	x	x			x	x		x	x	x	x	x
X15		x	x	x		x		x	x	x	x	x	x	x	x
X16		x		x		x		x	x				x		
X17		x	x	x	x	x		x	x	x	x	x	x	x	x

161 162 163 164 165 166 167 168 169 170 171 172 173 174 175

X1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X3	x	x	x	x	x	x	x								
X4								x	x	x	x	x	x	x	x
X5	x	x						x	x	x	x	x	x	x	x
X6			x	x	x	x		x	x	x	x	x	x	x	x
X7	x		x	x	x	x	x	x	x	x	x	x	x	x	x
X8	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X9			x	x	x		x	x	x	x	x	x	x	x	x
X10	x		x	x	x	x	x	x	x	x	x	x	x	x	x
X11	x		x	x	x	x	x	x	x	x	x	x	x	x	x
X12	x	x	x			x	x	x	x	x	x	x	x	x	x
X13	x	x	x	x		x	x	x	x	x	x	x	x	x	x
X14		x	x	x		x		x	x	x	x				
X15	x	x	x	x		x	x	x	x			x	x		
X16	x		x	x	x		x		x		x				
X17	x	x	x	x	x	x	x		x	x	x		x	x	x

176 177 178 179 180 181 182 183 184 185 186 187 188 189 190

X1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X3															
X4	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X5	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X6	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X7	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X8	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

X9	x	x	x	x	x	x	x	x	x	x	x	x	x		
X10	x	x	x	x	x	x	x	x	x	x	x	x		x	x
X11	x	x	x	x	x	x	x	x					x	x	x
X12	x	x	x						x	x		x	x		
X13				x	x	x			x	x	x	x	x	x	
X14	x			x			x	x		x	x	x	x	x	
X15	x	x	x	x	x	x	x	x	x	x		x	x	x	x
X16	x	x		x	x		x		x	x			x	x	x
X17	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

191 192 193 194 195 196 197 198 199 200 201 202 203 204 205

X1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X3															
X4	x	x	x	x	x	x	x	x	x						
X5	x	x	x	x	x	x	x			x	x	x	x	x	x
X6	x	x	x	x	x	x		x	x	x	x	x	x	x	x
X7	x	x	x	x	x		x	x	x	x	x	x	x	x	x
X8	x				x	x	x	x	x	x	x	x	x	x	x
X9		x	x	x		x	x	x	x	x	x	x	x	x	x
X10	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X11		x	x	x	x	x	x		x	x	x	x	x	x	x
X12		x			x		x	x	x	x	x	x	x	x	x
X13		x	x		x	x		x	x	x	x	x	x		
X14		x	x	x		x		x	x	x	x	x		x	x
X15		x		x	x	x	x	x	x	x	x	x	x	x	x
X16	x			x		x		x	x	x			x	x	
X17	x	x	x	x	x	x	x	x	x	x	x		x	x	x

206 207 208 209 210 211 212 213 214 215 216 217 218 219 220

X1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X2	x	x	x	x	x	x	x	x	x	x					
X3										x	x	x	x	x	
X4										x	x	x	x	x	
X5	x	x	x	x	x	x	x			x	x	x	x		
X6	x	x	x	x	x	x	x	x		x	x				
X7	x	x	x	x	x			x		x	x	x		x	
X8	x	x	x	x		x	x	x		x	x	x		x	
X9	x	x	x		x	x		x		x	x	x	x	x	
X10	x	x	x	x	x	x		x		x	x	x		x	
X11	x	x	x	x		x		x		x	x		x	x	
X12				x		x	x			x	x	x	x	x	
X13	x	x		x		x	x	x		x	x	x	x	x	
X14	x	x	x	x	x	x	x	x		x	x			x	
X15	x	x	x	x	x	x		x		x	x	x	x	x	
X16	x		x	x		x		x		x		x	x		

X17 x x x x x x x x x x x x x x x

221 222 223 224 225 226 227 228 229 230 231 232 233 234 235

X1	x	x	x	x	x	x	x	x	x	x				
X2											x	x	x	x
X3	x	x	x								x	x	x	x
X4				x	x	x					x	x	x	x
X5	x	x		x	x		x				x	x	x	x
X6	x	x		x	x	x	x				x	x	x	x
X7	x	x		x	x	x	x				x	x	x	x
X8	x			x	x	x	x				x	x	x	x
X9	x	x		x	x	x	x				x	x	x	x
X10	x	x		x	x	x	x				x	x	x	x
X11	x	x		x	x	x	x				x	x	x	x
X12	x			x	x	x	x	x			x	x	x	x
X13	x	x		x	x	x		x			x	x	x	x
X14	x	x		x		x	x	x			x	x		x
X15	x				x	x	x	x	x		x	x	x	x
X16	x				x	x	x	x	x		x		x	x
X17	x	x		x	x	x	x	x	x		x	x	x	x

236 237 238 239 240 241 242 243 244 245 246 247 248 249 250

X1														
X2	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X3	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X4	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X5	x	x	x	x	x	x	x	x	x	x				x
X6	x	x	x	x	x	x	x	x			x	x	x	x
X7	x	x	x	x	x	x			x		x	x	x	x
X8	x	x	x	x	x		x		x	x	x	x	x	x
X9	x	x	x	x			x		x	x	x	x	x	x
X10	x	x	x		x		x	x	x		x	x	x	x
X11	x	x	x		x			x			x	x	x	x
X12				x	x	x	x	x	x	x	x	x	x	x
X13	x			x	x	x	x	x	x	x	x	x	x	x
X14	x			x	x	x	x	x	x	x		x	x	x
X15	x	x			x	x	x		x	x	x	x	x	x
X16	x	x			x	x	x		x		x	x	x	x
X17	x			x	x	x	x	x	x	x	x	x	x	x

251 252 253 254 255 256 257 258 259 260 261 262 263 264 265

X1														
X2	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X3	x	x	x	x	x	x	x	x	x	x				
X4											x	x	x	x
X5	x	x	x	x	x	x					x	x	x	x

X6	x	x	x				x	x	x		x	x	x		x
X7	x	x					x	x	x	x	x	x	x		x
X8	x	x	x	x	x	x	x	x	x	x	x	x	x		x
X9	x	x					x				x	x	x	x	x
X10	x		x	x			x				x	x	x		x
X11	x			x			x				x	x	x		x
X12			x	x	x	x	x	x	x	x	x			x	x
X13			x	x	x	x	x	x	x	x	x	x	x	x	x
X14			x	x	x	x	x	x	x	x	x	x	x	x	x
X15	x	x	x	x	x		x	x			x		x	x	x
X16	x						x	x			x	x	x	x	x
X17	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

266 267 268 269 270 271 272 273 274 275 276 277 278 279 280

X1															
X2	x														
X3		x	x	x	x	x	x	x	x	x	x	x	x	x	x
X4		x	x	x	x										
X5	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X6	x	x				x	x	x					x	x	
X7		x	x			x	x	x					x	x	
X8	x	x	x	x		x	x		x	x	x	x	x	x	x
X9		x				x	x	x							
X10	x	x				x		x	x					x	
X11	x	x				x		x						x	
X12	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X13	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X14	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X15	x	x	x	x	x	x	x	x	x	x	x			x	x
X16		x						x		x			x	x	
X17	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

281 282 283 284 285 286 287 288 289 290 291 292 293 294 295

X1															
X2															
X3		x	x	x	x										
X4					x	x	x								
X5					x	x	x	x	x	x	x	x	x	x	x
X6							x								
X7							x								
X8	x	x	x	x	x	x		x	x	x	x				x
X9					x				x			x			
X10	x								x						
X11		x													
X12	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
X13	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

```

X14    x x x x x x x x x x x x x x x x
X15    x x x x x x x x x x x x x
X16    x   x   x       x   x       x
X17    x x x x x x x x x x x x x x x

```

296 297 298 299 300 301 302

```

X1
X2
X3
X4
X5
X6
X7
X8
X9    x
X10   x
X11   x
X12   x x x
X13   x x x x
X14   x x x x
X15   x x x x x x
X16   x x   x x
X17   x x x x x x x

```

MISSING DATA PATTERN FREQUENCIES

Pattern	Frequency	Pattern	Frequency	Pattern	Frequency
1	12640	102	2	203	6
2	55	103	3	204	1
3	810	104	1	205	1
4	10	105	1	206	2
5	158	106	1	207	1
6	2	107	1	208	2
7	204	108	1	209	2
8	76	109	1	210	1
9	411	110	1	211	1
10	4	111	1	212	1
11	41	112	1	213	1
12	11	113	3	214	1
13	20	114	26	215	10
14	6	115	4	216	21
15	142	116	3	217	2
16	1	117	1	218	1
17	12	118	1	219	1
18	8	119	2	220	1

19	6	120	1	221	1
20	57	121	1	222	1
21	7	122	1	223	1
22	3	123	1	224	1
23	6	124	1	225	1
24	5	125	1	226	1
25	339	126	10	227	1
26	4	127	128	228	1
27	40	128	1	229	1
28	2	129	16	230	6
29	20	130	2	231	50
30	15	131	4	232	4
31	2	132	20	233	3
32	91	133	5	234	2
33	22	134	3	235	1
34	9	135	1	236	2
35	10	136	1	237	1
36	65	137	6	238	1
37	10	138	1	239	1
38	4	139	6	240	1
39	205	140	1	241	1
40	19	141	1	242	1
41	1	142	3	243	1
42	16	143	3	244	1
43	28	144	3	245	1
44	46	145	1	246	2
45	50	146	1	247	1
46	1	147	1	248	1
47	4	148	1	249	1
48	1	149	2	250	2
49	3	150	1	251	1
50	1	151	1	252	1
51	2	152	1	253	1
52	1	153	3	254	1
53	1	154	1	255	1
54	3	155	1	256	1
55	1	156	1	257	1
56	1	157	1	258	1
57	2	158	1	259	1
58	2	159	1	260	1
59	2	160	1	261	1
60	21	161	1	262	1
61	5	162	1	263	1
62	1	163	2	264	1
63	1	164	1	265	2
64	1	165	1	266	1

65	3	166	1	267	2
66	5	167	2	268	1
67	17	168	5	269	2
68	4	169	101	270	1
69	1	170	8	271	1
70	6	171	2	272	1
71	1	172	1	273	1
72	2	173	4	274	1
73	1	174	1	275	2
74	1	175	1	276	1
75	1	176	1	277	2
76	1	177	2	278	2
77	1	178	2	279	1
78	1	179	6	280	1
79	2	180	4	281	1
80	1	181	1	282	1
81	1	182	3	283	2
82	10	183	1	284	1
83	12	184	1	285	1
84	1	185	1	286	1
85	1	186	2	287	1
86	1	187	1	288	1
87	1	188	1	289	1
88	1	189	1	290	2
89	1	190	1	291	5
90	1	191	1	292	1
91	1	192	1	293	1
92	17	193	1	294	1
93	1	194	1	295	2
94	1	195	1	296	1
95	1	196	4	297	1
96	1	197	1	298	1
97	1	198	2	299	1
98	3	199	1	300	6
99	40	200	22	301	1
100	3	201	5	302	1
101	1	202	1		

COVARIANCE COVERAGE OF DATA

Minimum covariance coverage value 0.100

PROPORTION OF DATA PRESENT

	Covariance Coverage				
	X1	X2	X3	X4	X5
X1	0.991				
X2	0.989	0.994			
X3	0.977	0.981	0.984		
X4	0.973	0.976	0.968	0.978	
X5	0.986	0.989	0.979	0.974	0.993
X6	0.985	0.988	0.977	0.973	0.987
X7	0.986	0.990	0.979	0.974	0.988
X8	0.986	0.990	0.980	0.975	0.990
X9	0.984	0.987	0.977	0.972	0.986
X10	0.985	0.988	0.978	0.973	0.987
X11	0.982	0.985	0.975	0.970	0.983
X12	0.925	0.928	0.921	0.915	0.929
X13	0.945	0.949	0.940	0.935	0.949
X14	0.920	0.923	0.915	0.911	0.924
X15	0.945	0.949	0.939	0.934	0.949
X16	0.896	0.899	0.890	0.886	0.898
X17	0.974	0.978	0.968	0.962	0.978

	Covariance Coverage				
	X6	X7	X8	X9	X10
X6	0.990				
X7	0.988	0.992			
X8	0.988	0.990	0.994		
X9	0.985	0.987	0.987	0.990	
X10	0.986	0.988	0.988	0.987	0.991
X11	0.983	0.985	0.985	0.983	0.985
X12	0.926	0.928	0.931	0.927	0.928
X13	0.947	0.949	0.951	0.947	0.948
X14	0.921	0.923	0.925	0.922	0.922
X15	0.947	0.949	0.950	0.947	0.948
X16	0.897	0.899	0.900	0.898	0.899
X17	0.975	0.977	0.979	0.976	0.977

	Covariance Coverage				
	X11	X12	X13	X14	X15
X11	0.987				
X12	0.925	0.933			
X13	0.946	0.917	0.954		

X14	0.920	0.894	0.911	0.928	
X15	0.945	0.900	0.918	0.895	0.953
X16	0.896	0.852	0.869	0.848	0.887
X17	0.974	0.923	0.943	0.918	0.948

	Covariance Coverage	
	X16	X17
X16	0.902	
X17	0.898	0.983

SUMMARY OF CATEGORICAL DATA PROPORTIONS

X1	
Category 1	0.726
Category 2	0.274
X2	
Category 1	0.898
Category 2	0.102
X3	
Category 1	0.552
Category 2	0.448
X4	
Category 1	0.672
Category 2	0.328
X5	
Category 1	0.597
Category 2	0.403
X6	
Category 1	0.775
Category 2	0.225
X7	
Category 1	0.758
Category 2	0.242
X8	
Category 1	0.650
Category 2	0.350
X9	
Category 1	0.478
Category 2	0.522
X10	
Category 1	0.639
Category 2	0.361
X11	

Category 1	0.731
Category 2	0.269

X12

Category 1	0.504
Category 2	0.496

X13

Category 1	0.599
Category 2	0.401

X14

Category 1	0.595
Category 2	0.405

X15

Category 1	0.648
Category 2	0.352

X16

Category 1	0.565
Category 2	0.435

X17

Category 1	0.405
Category 2	0.595

RESULTS FOR BASIC ANALYSIS

ESTIMATED SAMPLE STATISTICS

MEANS/INTERCEPTS/THRESHOLDS					
	X1\$1	X2\$1	X3\$1	X4\$1	X5\$1
1	0.599	1.269	0.129	0.445	0.244

MEANS/INTERCEPTS/THRESHOLDS					
	X6\$1	X7\$1	X8\$1	X9\$1	X10\$1
1	0.755	0.700	0.387	-0.054	0.355

MEANS/INTERCEPTS/THRESHOLDS					
	X11\$1	X12\$1	X13\$1	X14\$1	X15\$1

1	0.615	0.009	0.251	0.239	0.380
---	-------	-------	-------	-------	-------

MEANS/INTERCEPTS/THRESHOLDS

	X16\$1	X17\$1
--	--------	--------

1	0.164	-0.240
---	-------	--------

CORRELATION MATRIX (WITH VARIANCES ON THE DIAGONAL)

	X1	X2	X3	X4	X5
X1					
X2	0.345				
X3	0.127	0.002			
X4	0.283	0.237	0.060		
X5	0.535	0.196	0.151	0.377	
X6	0.314	0.304	0.119	0.250	0.319
X7	0.241	0.210	0.078	0.131	0.208
X8	0.132	0.080	0.281	0.139	0.171
X9	0.262	0.109	0.157	0.229	0.278
X10	0.285	0.234	0.106	0.193	0.290
X11	0.235	0.324	0.018	0.190	0.220
X12	0.021	0.010	0.299	0.068	0.092
X13	0.060	0.058	0.135	0.089	0.092
X14	0.149	0.147	0.061	0.378	0.182
X15	0.001	0.012	0.042	0.076	-0.004
X16	0.075	0.030	0.118	0.091	0.075
X17	0.033	0.026	0.043	0.018	0.041

CORRELATION MATRIX (WITH VARIANCES ON THE DIAGONAL)

	X6	X7	X8	X9	X10
X7	0.301				
X8	0.122	0.201			
X9	0.254	0.121	0.135		
X10	0.293	0.145	0.140	0.295	
X11	0.224	0.194	0.083	0.148	0.549
X12	0.038	-0.029	0.135	0.047	0.049
X13	0.064	0.060	0.325	0.049	0.075
X14	0.127	0.048	0.115	0.106	0.065
X15	-0.057	-0.062	0.068	0.005	-0.006
X16	0.086	0.028	0.127	0.163	0.088
X17	0.080	0.032	0.073	0.035	0.085

CORRELATION MATRIX (WITH VARIANCES ON THE DIAGONAL)

	X11	X12	X13	X14	X15
X12	0.021				
X13	0.068	0.350			
X14	0.098	0.106	0.098		
X15	0.052	0.128	0.131	0.081	
X16	0.047	0.103	0.121	0.069	0.587
X17	0.044	0.048	0.057	0.003	0.219

CORRELATION MATRIX (WITH VARIANCES ON THE DIAGONAL)

	X16	X17
X17	0.234	

STANDARD ERRORS FOR ESTIMATED SAMPLE STATISTICS

S.E. FOR MEANS/INTERCEPTS/THRESHOLDS

	X1\$1	X2\$1	X3\$1	X4\$1	X5\$1
1	0.010	0.013	0.010	0.010	0.010

S.E. FOR MEANS/INTERCEPTS/THRESHOLDS

	X6\$1	X7\$1	X8\$1	X9\$1	X10\$1
1	0.011	0.011	0.010	0.010	0.010

S.E. FOR MEANS/INTERCEPTS/THRESHOLDS

	X11\$1	X12\$1	X13\$1	X14\$1	X15\$1
1	0.010	0.010	0.010	0.010	0.010

S.E. FOR MEANS/INTERCEPTS/THRESHOLDS

	X16\$1	X17\$1
1	0.010	0.010

S.E. FOR CORRELATION MATRIX (WITH VARIANCES ON THE
DIAGONAL)

	X1	X2	X3	X4	X5
X1					
X2	0.016				
X3	0.013	0.017			
X4	0.013	0.016	0.013		
X5	0.010	0.016	0.012	0.012	
X6	0.013	0.016	0.014	0.013	0.013
X7	0.014	0.017	0.013	0.014	0.013
X8	0.013	0.017	0.012	0.013	0.012
X9	0.013	0.017	0.012	0.012	0.012
X10	0.013	0.016	0.013	0.013	0.012
X11	0.013	0.016	0.013	0.013	0.013
X12	0.013	0.017	0.012	0.013	0.013
X13	0.013	0.017	0.013	0.013	0.013
X14	0.013	0.017	0.013	0.012	0.013
X15	0.014	0.017	0.013	0.013	0.013
X16	0.014	0.017	0.013	0.013	0.013
X17	0.013	0.017	0.013	0.013	0.013

S.E. FOR CORRELATION MATRIX (WITH VARIANCES ON THE
DIAGONAL)

	X6	X7	X8	X9	X10
X7	0.014				
X8	0.014	0.013			
X9	0.013	0.013	0.012		
X10	0.013	0.013	0.013	0.012	
X11	0.014	0.014	0.013	0.013	0.010
X12	0.014	0.014	0.013	0.013	0.013
X13	0.014	0.014	0.012	0.013	0.013
X14	0.014	0.014	0.013	0.013	0.013
X15	0.014	0.014	0.013	0.013	0.013
X16	0.014	0.014	0.013	0.013	0.013
X17	0.014	0.014	0.013	0.012	0.013

S.E. FOR CORRELATION MATRIX (WITH VARIANCES ON THE
DIAGONAL)

	X11	X12	X13	X14	X15
X12	0.014				
X13	0.014	0.012			

X14	0.014	0.013	0.013		
X15	0.014	0.013	0.013	0.013	
X16	0.014	0.013	0.013	0.013	0.010
X17	0.013	0.013	0.013	0.013	0.013

S.E. FOR CORRELATION MATRIX (WITH VARIANCES ON THE
DIAGONAL)

	X16	X17
X17	0.013	

Beginning Time: 17:10:09

Ending Time: 17:10:20

Elapsed Time: 00:00:11

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APPENDIX I

SR1 HIV/AIDS Knowledge Sources

Category	SR1 knowledge source(s)	Frequency (%)
Nowhere	no one/nowhere, don't know	2.14
Medical institutions	clinic/hospital/doctor, health motivator/AIDS facilitator	15.06
Media	TV, radio, book/pamphlets/newspaper/magazine, videocassettes, AIDS awareness campaigns	43.62
Peers or family	family, friends/neighbours, youth groups, peer educators, other HIV-positive people, anti-AIDS club, counselling, support groups,	10.14
NGOs/community activities	workshops, community groups, NGOs, NANAWO, women's organization group, FLAS, TASC, extension workers, BLM/Banja La Mtsogolo, MACRO, NAPHAM, Mangochi, Iguja, Paevista, FACT, AIDS city council	6.52
International organizations	WHO, My Future My Choice, United Nations, Red Cross, UNICEF	0.12
Schools/workplace	school/teacher, workplace	15.66
Religious institutions	church/pastor, Salvation Army, Catholics in Action	1.62
CIET interview	CIET interview	0.02

APPENDIX J

Univariate and Multivariable Regression Results

Multivariable, standardized regression results (not adjusted for covariates)

	Reciprocity		Physical violence		Right of Refusal		Condom use		Violence against women	
	Std Est.	P-value	Std Est.	P-value	Std Est.	P-value	Std Est.	P-value	Std Est.	P-value
NOWHERE	-	-	-	-	-	-	-	-	-	-
MEDICAL	-	0.006	-	0.000	-	0.741	-	0.060	-0.099	0.005
	0.105		0.197		0.016		0.071			
MEDIA	-	0.018	-	0.000	-	0.044	-	0.034	-0.112	0.011
	0.115		0.301		0.139		0.105			
PEERS	-	0.000	-	0.000	-	0.709	-	0.000	-0.026	0.466
	0.162		0.179		0.018		0.177			
NGO	-	0.000	-	0.000	-	0.714	-	0.001	-0.083	0.001
	0.151		0.148		0.014		0.106			
SCHOOL	-	0.000	-	0.000	-	0.004	-	0.000	-0.098	0.001
	0.288		0.208		0.133		0.209			
RELIGIOUS	-	0.001	-	0.024	-	0.919	-	0.003	-0.004	0.824
	0.063		0.048		0.003		0.063			
INTERL	-	0.002	-	0.062	-	0.000	-	0.068	-0.021	0.030
	0.026		0.019		0.042		0.018			

Covariate-adjusted, multivariable, standardized regression results

	Reciprocity		Physical violence		Right of Refusal		Condom use		Violence against women	
	Std Est.	P-value	Std Est.	P-value	Std Est.	P-value	Std Est.	P-value	Std Est.	P-value
NOWHERE	-	-	-	-	-	-	-	-	-	-
MEDICAL	-		-		-		-		-	
	0.063	0.082	0.172	0.000	0.004	0.932	0.057	0.145	-0.103	0.003
MEDIA	-		-		-		-		-	
	0.090	0.053	0.269	0.000	0.111	0.075	0.103	0.052	-0.119	0.006
PEERS	-		-		-		-		-	
	0.120	0.002	0.157	0.000	0.001	0.991	0.167	0.000	-0.021	0.541
NGO	-		-		-		-		-	
	0.115	0.000	0.122	0.000	0.001	0.970	0.101	0.002	-0.078	0.002
SCHOOL	-		-		-		-		-	
	0.179	0.000	0.160	0.000	0.072	0.085	0.158	0.000	-0.093	0.001
RELIGIOUS	-		-		-		-		-	
	0.033	0.055	0.029	0.140	0.008	0.736	0.056	0.012	-0.004	0.829
INTERL	-		-		-		-		-	
	0.018	0.038	0.015	0.155	0.035	0.000	0.015	0.133	-0.024	0.010

Univariate, standardized regression results (not adjusted for covariates)

	Reciprocity		Physical violence		Right of Refusal		Condom use		Violence against women	
	Std Est.	P-value	Std Est.	P-value	Std Est.	P-value	Std Est.	P-value	Std Est.	P-value
NOWHERE	0.064	0.000	0.104	0.000	0.040	0.087	0.054	0.002	0.039	0.011
MEDICAL	0.019	0.319	0.003	0.889	0.066	0.000	0.053	0.101	-0.026	0.225
MEDIA	0.154	0.000	-	0.563	0.071	0.009	0.099	0.000	-0.013	0.463
PEERS	-	0.480	0.001	0.951	0.054	0.021	0.092	0.000	0.054	0.002
NGO	-	0.067	-	0.405	0.035	0.202	0.037	0.106	-0.026	0.099
SCHOOL	-	0.194	-	0.021	0.079	0.000	0.122	0.000	-0.025	0.101
RELIGIOUS	-	0.015	0.287	0.028	0.006	0.025	0.151	0.021	0.418	0.024
INTERL	-	0.017	0.046	0.004	0.782	0.037	0.000	0.008	0.658	-0.014
									0.140	

Covariate-adjusted, univariate, standardized regression results

	Reciprocity		Physical violence		Right of Refusal		Condom use		Violence against women	
	Std Est.	P-value	Std Est.	P-value	Std Est.	P-value	Std Est.	P-value	Std Est.	P-value
NOWHERE	0.043	0.008	0.088	0.000	0.028	0.186	0.046	0.013	0.040	0.008
MEDICAL	0.021	0.184	0.001	0.976	0.051	0.001	0.051	0.014	-0.026	0.217
MEDIA	0.085	0.000	0.039	0.045	0.087	0.001	0.072	0.008	-0.017	0.363
PEERS	-	0.041	0.053	0.005	0.781	0.048	0.030	0.089	0.000	0.060
NGO	-	0.058	0.008	0.006	0.717	0.035	0.189	0.039	0.074	-0.023
SCHOOL	-	0.104	0.000	0.001	0.934	0.033	0.095	0.075	0.000	-0.019
RELIGIOUS	0.001	0.927	0.039	0.003	0.026	0.102	0.018	0.273	0.025	0.072
INTERL	-	0.010	0.215	0.001	0.955	0.032	0.000	0.004	0.642	-0.016
									0.074	