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SAN DIEGO STATE UNIVERSITY

Research on Sexual and Condom Use Behaviors in the Botswana Defence Force

A dissertation submitted in partial satisfaction of the requirements for the degree
Doctor of Philosophy

in

Public Health (Epidemiology)

by

Bonnie Robin Tran

Committee in charge:

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           Professor Christina Chambers
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2012

The Dissertation of Bonnie Robin Tran is approved, and it is acceptable in quality and

form for publication on microfilm and electronically:

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<div align="right">Chair</div>

University of California, San Diego

San Diego State University

2012

DEDICATION

To my extraordinary husband Joseph,

my loving family Paul, Katie, Linh, and Michael,

and my affectionate bulldog Maggie Magpie Murray

All people share the same ancestry.

Botswanan proverb

TABLE OF CONTENTS

LIST OF ACRONYMS

AIDS	Acquired Immune Deficiency Disorder
AUDIT	Alcohol Use Disorders Identification Test
BAIS	Botswana AIDS Impact Survey
BDF	Botswana Defence Force
CUR	Condom use rate
HIV	Human Immunodeficiency Virus
MC	Male circumcision
MELR	Mixed-effects logistic regression
MSM	Men who have sex with men
NCO	Non-commissioned officer
PSI	Population Services International
SABERS	HIV Seroprevalence and Behavioral Epidemiology Risk Survey
SAS	Statistical Analysis Software
SEKWATA	Sex Education Knowledge with AIDS Testing Awareness
STI	Sexually transmitted infection
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNGASS	United Nations General Assembly Special Session
US	United States of America
VIF	Variance inflation factor

LIST OF TABLES

LIST OF FIGURES

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Norris, P. S., Li, C., Ni, C.-Z, Havert, M. L., Chiong, E. M., Tran, B. R., Cabezas, E., Reed, J. C., Satterwait, A. C., Ware, C. F., & Ely, K. R (2003, December). Structurally distinct recognition motifs in lymphotoxin-receptor and CD40 for TRAF Mediated Signaling. Journal of Biological Chemistry, 278(50), 50523–50529.

Thomas AG, Tran BR, Cranston M, Brown MC, Kumar R, *et al.* (2011) Voluntary Medical Male Circumcision: A Cross-Sectional Study Comparing Circumcision Self-Report and Physical Examination Findings in Lesotho. PLoS ONE 6(11): e27561. doi:10.1371/journal.pone.0027561.

ABSTRACT OF THE DISSERTATION

Research on Sexual and Condom Use Behaviors in the Botswana Defence Force

by

Bonnie Robin Tran

Doctor of Philosophy in Public Health (Epidemiology)

University of California, San Diego, 2012
San Diego State University, 2012

Professor Richard Shaffer, Chair

Background: Studies show inconsistent condom use is relatively common among military personnel. In an effort to increase condom use among soldiers, an intervention was implemented to examine the effects of condom scent and wrapper graphics on usage in the Botswana Defence Force (BDF). Current condom use behaviors and correlates of lower condom use were characterized, and differences in reporting behaviors from a retrospective survey and a prospective diary were also examined.

Methods: From October 2010–April 2011, 211 sexually-active male BDF soldiers, aged 18–30, participated in the study. Participants at four military bases received condoms in a plain blue or camouflage wrapper, either scented or unscented. A baseline survey collected demographics and HIV risk behaviors. Pre- and post-intervention behaviors were measured with two diaries each. A retrospective survey was administered immediately after the post-intervention diaries, which queried participants about behaviors as reported in those diaries. Several participants were also randomly selected to participate in focus group sessions which included discussions about condoms, condom use, and reporting of sexual behaviors.

Results: Only 51% of participants reported always using condoms at baseline. Lower condom use was associated with excessive alcohol use, reported trust for a sexual partner, and the perception that condoms make sex less enjoyable. Scented condoms and condoms packaged in a camouflage wrapper were found to increase condom use rates in the BDF. Most sexual behaviors reported in the survey and diary were similar, with the exception of behaviors associated with having a regular partner, reports of exchanging material goods for sex with a casual partner, and reports of some retrospective condom use categories.

Conclusions: HIV interventions aimed at increasing condom use in the BDF should address alcohol abuse, beliefs about condoms, and issues of trust. The BDF should consider providing scented condoms and condoms packaged in a camouflage wrapper, coupled with messages of correct and consistent condom use, which may help increase usage. Results suggest that retrospective surveys are useful for measuring recent

sexual behaviors, although prospective diaries may be more reliable in collecting routine and sensitive sexual practices in the BDF.

INTRODUCTION

HIV/AIDS is a devastating disease that affects millions of people around the world. The region most afflicted by the epidemic is Sub-Saharan Africa, with the highest number of HIV cases and AIDS-related deaths. Botswana is one of several countries within this region that continues to bear the burden of the HIV epidemic, with a national prevalence of 18%.

In the absence of a cure, and lack of an effective vaccine for HIV, behavioral change remains critical in reducing the number of new infections. In order to effectively develop HIV prevention programs and policies targeting behavioral change, we first must understand the types of risky behaviors that are driving the epidemic. Sexual behavioral research, including condom use, has commonly been conducted in civilian populations. Research among military personnel is needed as this population is governed by different occupational, social, and cultural norms that may place them at higher risk for HIV.

Because the military is a country's primary defense system, preventing HIV and other sexually transmitted infections (STIs) in this population is important, as disease may compromise force readiness. Numerous studies have demonstrated that correct and consistent condom use is highly effective against HIV. However, studies also show that condom use is relatively inconsistent and unpopular among military personnel. Although studies have been done in many different militaries, further studies in other militaries are needed, as behaviors and cultures differ between countries. Therefore, the first objective of this dissertation was to examine condom use

behaviors in the Botswana Defence Force (BDF). The results will help researchers better understand current condom use practices in the BDF.

In an effort to reduce HIV risk in their military, the BDF provides free condoms to their members. However, anecdotal reports suggest that the government-issued condoms are often not used due to an unpleasant scent and unappealing wrapper. Further, formative work found that scented condoms were highly preferred and that condoms packaged in a military-inspired camouflage wrapper were appealing to BDF military members. Condoms remain the cheapest prevention method against HIV infection and are highly effective if used appropriately. Thus, the second objective of this dissertation was to try to increase condom use among BDF military personnel by providing appealing condoms they would want to use. An intervention study was implemented to investigate the effect of scent and condom wrapper graphics on condom use. Results could be used by the BDF to determine what types of condom should be distributed to their personnel.

Research that involves measuring sexual behaviors, including condom use, typically relies on self-reports from study participants. While some studies have used prospective diaries to measure these self-reported behaviors, most have commonly used retrospective surveys. To our knowledge, comparisons of diary and retrospective survey estimates of reported sexual behaviors among military personnel have not been previously explored. Research among this population is needed because soldiers may be influenced by different cultural and social norms that may affect sexual behavior reporting. Therefore, the third objective of this dissertation was to examine reporting

behaviors among the BDF using two different measurement tools, a prospective diary and retrospective survey.

The findings of this dissertation are drawn from an intervention study conducted in the BDF from October 2010–April 2011. Four BDF military sites were selected to participate. Participants were recruited through the use of flyers, command newsletters, and regular communication channels at the bases. Individuals were eligible to participate if they were sexually-active male BDF personnel, aged 18–30, and stationed at the four selected military sites. A total of 211 men (81.2%), of an original target sample size of 260, provided written informed consent. Data was collected with a baseline survey, four sexual behavior diaries, a follow-up survey, and focus group sessions. Institutional review boards in the United States (Naval Health Research Center and San Diego State University, San Diego, California) and Botswana (Ministry of Health, Gaborone, Botswana) approved this study prior to data collection.

CHAPTER 1

HIV/AIDS EPIDEMIC

Global Overview

Approximately 34 million people worldwide are estimated to be living with HIV [1]. The region that remains the most affected by the HIV/AIDS epidemic is Sub-Saharan Africa. Approximately 22.9 million adults and children in Sub-Saharan Africa are estimated to be living with HIV, and about 1.2 million have died from AIDS-related deaths. This corresponds to 68% of the total number of HIV cases in the world and 72% of all deaths attributable to the epidemic. Although the number of adults and children newly infected with HIV in 2010 dropped by over 13% compared to estimates in 2001 (1.9 million vs. 2.2 million), the region still accounted for 70% of all new HIV cases that year.

Botswana

Since gaining independence in 1966, Botswana has been governed through democratic elections, remains free of major wars, and experiences a growing and dynamic economy [2]. However, even as one of the more stable and richer countries in Africa, Botswana still suffers from one of the highest HIV prevalence in the world. The most recent Botswana AIDS Impact Survey (BAIS) III, a national survey conducted in 2008, indicated an overall HIV prevalence of 17.6% [3], which is slightly higher than the 2004 estimate of 17.1% [4]. Consistent with results from the 2004 BAIS, the prevalence is also slightly higher in the urban areas of Botswana as compared to the rural areas (17.9% vs. 17.1%). Among adults aged 15–49, the

prevalence is 25.0%, which is similar to estimates reported by UNAIDS in 2008 [5]. When the adult prevalence is further stratified by sex, estimates are substantially higher among women as compared to men (29.2% vs. 19.6%) [3]. Currently, there are approximately 320,000 adults and children (of approximately 2 million people) living with HIV in Botswana, and over 5,000 people have died of AIDS-related causes [5].

The government of Botswana has been instrumental in generating a national response to the HIV/AIDS epidemic. A year after the first AIDS case was identified in the country (1985), the National AIDS Control Programme was created under the Ministry of Health [6]. The first national response mainly focused on screening donated blood to eliminate HIV transmission through contaminated blood transfusions. Over the years, as the prevalence continued to grow, a series of 5-year strategic plans that used a multi-sectorial approach were implemented to launch a more affective national response. These strategic plans lead to the development of a National Strategic Framework from 2003–2009, which coordinated the work of all partners, and provided relevant structures and guidance. The original goals of the framework were comprehensive, including preventing HIV infection, providing treatment, care and support, strengthening the management of the national response to HIV/AIDS, mitigating psychosocial and economic impact, and provision of a strengthened legal and ethical environment. The current goals of the 2010–2016 Framework include prevention of new HIV infections, systems strengthening, strategic information management, and scaling up HIV treatment, care and support.

Military Populations

There is a commonly accepted belief that the HIV prevalence is much higher in military populations than the general population. However, as discussed by Whiteside *et al.* [7], this belief is too often "uncritically accepted and repeated", and is not necessarily true. While some militaries report a higher HIV prevalence in comparison to the general population [8, 9], data among other militaries suggest that the prevalence is comparable to [10] or even lower [11] than national estimates. Because published estimates on HIV prevalence among militaries is sparse due to the sensitive nature of the collected data, we must not presume that the prevalence is always higher among military populations. To better understand and characterize the HIV epidemic among their forces, several militaries have already conducted a seroprevalence and behavioral risk factor study, while others are currently in the planning phases [12].

Botswana Defence Force

This dissertation focuses on military personnel in the Botswana Defence Force (BDF), which is the primary defense system of the country of Botswana [2]. The BDF was established in 1977 and consists of several service branches including the Ground Forces, Air Arm, Defense Logistics, and Special Forces. Within these services, there are six military units: Air Arm, Fighting, Logistics, Support, Cadets, and Trainers. There are currently over 10,000 members in the BDF, including both men and women.

The containment of HIV is a top priority for the BDF to preserve force health and readiness. Voluntary counseling and testing centers are available at the bases, and members who test HIV-positive are provided with free care and treatment. Government-issued condoms are distributed at the bases through condom dispensers,

clinics, and peer educators. Several HIV prevention campaigns that encourage testing and condom use are active throughout the bases. Currently, the BDF does not have a mandatory HIV testing policy. Applicants to the BDF are required to take a screening test prior to enlistment that prevents those who test HIV-positive from joining. The BDF recently conducted their first HIV Seroprevalence and Behavioral Epidemiology Risk Survey (SABERS) in 2009. Due to the confidentiality of the data, the BDF has requested to withhold disclosing the military's HIV prevalence.

HIV RISK FACTORS

General Population of Botswana

Several factors driving the HIV/AIDS epidemic in the general population of Botswana include having multiple sexual partnerships [13], lack of consistent condom use [3], and alcohol abuse and risky sexual behaviors [14].

As discussed by Halperin *et al.* [15], one possible reason why the prevalence remains high in Africa is because of the common occurrence of multiple sexual partnerships, particularly those that are concurrent. A concurrent partnership is typically defined as having overlapping sexual relationships with more than one person. Mathematical stimulations demonstrate that concurrent partnerships exponentially increase the number of infected individuals and the growth rate of the HIV epidemic in comparison to serial relationships [16]. Although serial relationships also create sexual networks that may fuel the HIV epidemic, concurrency results in networks that are substantially larger and more efficient in spreading the virus. Concurrency may also increase the probability that a newly infected individual may expose susceptible partners to the virus during the acute stage of HIV infection, when infectivity is increased due to high viral load [17]. Findings from a 2003 population-based survey suggest that multiple sexual partnerships, including concurrency, are relatively common in Botswana [13]. Among 546 sexually-active participants aged 15–49 years, 23.8% reported having more than one sexual partner (serial or concurrent) and 23.0% indicated ever having a concurrent partnership in the last 12 months preceding the survey.

In regards to condom use, although the government of Botswana provides free condoms to the public sector, the BIAS III indicated that condom use was inconsistent among the general population [3]. A little over half (51.6%) of male adults aged 15–49 reported using a condom the last time they had sex with their most recent partner and less than half (45.2%) reported always using a condom. The type of sexual partner may also influence condom use, with studies showing condom use to be typically lower with regular partners than with casual partners [18, 19]. Findings from the BIAS III showed that only 28.1% of male adults reported always using a condom with their regular partner, whereas 45.8% of males reported always using a condom with a non-regular partner [3]. Individuals in multiple sexual partnerships who are not consistently using condoms may be placing themselves and their partners at higher risk for HIV infection.

Several systematic reviews report strong associations of alcohol use with HIV infection [20] and risky sexual behaviors [21]. Alcohol use before a sexual encounter may affect an individual's sense of responsibility, and their ability to reason and make good judgments [22]. Findings from a 2006 cross-sectional, population-based study reported that alcohol abuse is relatively common in Botswana, with 17% of women and 31% of men meeting the criteria for heaving alcohol consumption (>14 drinks/week for women and >21 drinks/week for men). Among men, heavy alcohol use was significantly associated with unprotected sex, multiple sexual partners, and paying for sex ($p < 0.05$). Similar associations were observed among women where heavy alcohol consumption was found to be associated with higher odds of unprotected sex, multiple partners, and selling sex [14].

Military Personnel

Although the general population is at risk for HIV infection, there is concern that military personnel may be at higher risk due to unique circumstances that surround military service. These issues are discussed in further detail. Similar HIV risk factors identified in the general population, such as alcohol abuse and having multiple sexual partnerships, are also presented.

In comparison to the general population, military personnel are a highly mobile group. As a part of military service, soldiers are often sent away for deployments, trainings, and peace keeping missions. During these deployments, military personnel spend long periods of time away from their families and loved ones, including spouses and significant others. To relieve stress and loneliness, they may engage in risky sexual behaviors, such as having unprotected sex with sex workers [23, 24]. For example, in a 2002 cross-sectional study of 480 Nigerian Navy personnel, 21.3% reported that their work conditions affected their sexual behavior and that frequent transfers away from spouses predisposed them to have sex with multiple partners [25]. The authors also found that a majority of participants who reported any deployment were more likely to have had sex with a sex worker. When examining differences in risky behaviors by deployment type, soldiers deployed internationally were significantly more likely to have had sex with a sex worker (39.1% vs. 32.8%, $p = 0.03$), and less likely to have used a condom during the last sexual contact with a sex worker (42.3% vs. 52.0%, $p = 0.03$), compared to those deployed locally. Military personnel may also be deployed to regions with high HIV rates, increasing the opportunity for those engaged in risky sexual behaviors to be exposed to HIV.

Military personnel are also at higher risk for HIV because of their young age and susceptibility to peer pressure [23, 24]. They have disposable incomes, which can be used to purchase alcohol and drugs (in addition to sex), and are often placed in positions of power and authority, where they can give food, security, or shelter in exchange for sex. Furthermore, the military culture cultivates values of strength, fearlessness, and invincibility, which may encourage military personnel to engage in risky behaviors which they normally would not partake in. For example, studies found high HIV risk-taking behaviors among military personnel including having multiple sexual partners and abusing alcohol. A study in the Angolan military from 2003–2004 showed that 60% of soldiers reported having two or more sexual partners, and 42% were identified as problem drinkers according to the Alcohol Use Disorders Identification Test (AUDIT) [26]. Alcohol abuse among military personnel was also observed in a study of Nigerian soldiers, where 50% admitted to drinking alcohol in the previous 6 months prior to the survey, 22% were advised by a doctor or nurse to stop drinking, and 61% had sex after drinking alcohol [27]. In the Ethiopian military, data showed that 20% of soldiers reported drinking alcohol or using drugs before or during sexual intercourse [28]. In a recent (2010) study in the Belize Defense Force, over 50% reported having more than one sexual partner, and almost 40% had sex while drunk or high on drugs [11].

Preventing HIV/STI's in militaries is important as these outcomes are detrimental to the health of personnel and may compromise military readiness. As discussed by Heinecken *et al.* [29], the deployment of soldiers for peace keeping missions could be challenging if many highly trained soldiers have fallen ill.

Similarly, as discussed by Whiteside *et al.* [7], the loss of more senior officials and skilled personnel who are difficult to replace may compromise military effectiveness. Furthermore, the need to treat infected personnel and/or replace them may increase military costs [7, 29].

CONDOMS

Condoms as a Preventive Measure Against HIV/STIs

One of the cornerstones of HIV prevention is condom use. Longitudinal studies of HIV serodiscordant couples demonstrate that correct and consistent condom use is highly effective in preventing HIV [30–33]. For example, in a prospective cohort study from 1987–1992, 378 couples with discordant HIV status were followed over time to evaluate the effectiveness of condoms in preventing HIV infection and determine the rate of transmission for those who did not use condoms consistently. Of the 256 couples who continued to have sex with their partners for more than 3 months following study enrollment, 124 (48.4%) couples reported using condoms for every sexual occasion, 121 (47.3%) did not always using condoms, and 11 (4.3%) did not provide any condom use information. Among the 121 couples who did not use condoms consistently, 12 uninfected partners seroconverted, corresponding to an HIV seroconversion rate of 4.8 per 100 person-years (95% CI = 2.5–8.4). No seroconversions were observed for the 124 couples who reported using condoms consistently [33].

Several meta-analyses were performed to obtain an overall estimate of the effectiveness of condoms against HIV in the 1990's [34–36]. For example, Pinkerton *et al.* concluded that condoms were 90–95% effective against HIV when used consistently [35]. However, as pointed out by Davis *et al.*, Pinkerton *et al.* did not control for the different study designs and failed to exclude those who sometimes or occasionally used condoms from those who never used condoms. A reanalysis by

Davis *et al.* showed that the effectiveness of condoms at preventing HIV transmission was estimated at 87%, although it may be as low as 60% or as high as 96% [36].

<div align="center">**Condom Use Among Military Personnel**</div>

Although research shows that condom use is effective in preventing HIV/STI's, condom use among military personnel has generally been inconsistent and unpopular. For example, among Nigerian Navy personnel who ever had sex with a sex worker, 41% did not use a condom the last time they had sexual contact with that partner type [25]. Another study in the same military found that only 21% of soldiers reported always using a condom with a casual partner [27]. A study in the Angolan military found that only 54% of participants reported using a condom during their last sexual encounter with a sex worker [26].

The type of sexual partner may also influence condom use, with studies showing condom use to be typically lower with regular partners in comparison to causal partners [18, 19, 26]. In the study of Angolan soldiers [26], the percentage of participants who reported using condoms varied from 10–54%, depending on the type of partner. Few participants with a regular partner reported using a condom at last sex with that partner (9.7% for live-in partner and 36.5% for non-live-in partner); a higher percentage of participants reported using condoms with causal partners (47.8%) or sex workers (54.2%). Unpublished data from the 2009 HIV SABERS in male military personnel in the Botswana Defence Force (BDF) showed that among personnel with two partners (one regular and one casual partner), only 51.1% reported condom use

with the regular partner, while 86.8% reported always using condoms with the casual partner [37].

Several studies have explored reasons for low-level condom use among military personnel. A study in 481 Turkish military personnel found that 44.7% of Privates had not used condoms. Reported reasons for not using condoms consistently included a lack of enjoyment and feeling of discomfort, belief in its unreliability, and difficult access to the product [38]. Qualitative data analysis from a 2002 study of 64 military personnel in the Angolan Armed Forces reported soldiers were not using condoms due to low levels of motivation, lack of information, and a lack of behavioral skills [39]. Other reasons for not using a condom included a preference for skin-to-skin contact, belief in a condom's ineffectiveness, belief in the non-existence of HIV, conflicts with religious affiliation, being told by women that condoms were uncomfortable and caused burning, and the unavailability of condoms in remote and rural locations or while on missions. Among Nigerian Navy personnel, cited reasons for a lack of consistent condom use with sex workers included the belief that they were not susceptible to HIV infection, a dislike of condoms, lack of knowledge about AIDS, the unavailability of condoms, a need for full satisfaction, and the fact that the sex worker was a regular partner [25]. Reported reasons for low level condom use among soldiers in the Botswana Defense Force included trust for a sexual partner, reduced sexual enjoyment, and the unavailability of condoms [37].

Studies examining predictors of condom use among military personnel are few in number [40, 41]. A study by Essien *et al.* in 2003 among 2,214 Nigerian Uniformed

Service personnel examined socio-demographic and lifestyle predictors of the intention to use condoms [40]. Purchasing condoms was used as a proxy for the intention to use condoms. Positive predictors of condom use were male gender, knowledge of how to correctly wear a condom, and knowledge that HIV was transmitted through blood, saliva, or pre-ejaculatory fluid. Negative predictors included alcohol use, marijuana use, and oral sex. Another article, using the same study population, examined the associations of education with a) knowledge of condom use and b) how to correctly identify (i.e., model) the steps in proper condom use [41]. In unadjusted models, compared to those who completed less than a high school education, participants who completed high school or higher were two times more likely (OR = 2.32, 95% CI = 1.60–3.37) to demonstrate knowledge of condom use and correctly model condom use. However, these associations were no longer significant after adjusting for other predictors of condom use.

MEASURING SEXUAL AND CONDOM USE BEHAVIORS

Overview

Because research on sexual behaviors (i.e., sexual activity and condom use) relies heavily on self-reports from study participants, the use of valid and reliable measurement tools to accurately capture these behaviors and reduce measurement errors are extremely important. Many different modes of data collection are available, including face-to-face interviews, telephone interviews, and postal survey. The more commonly used data collection methods are self-completed survey and personal diaries, to a lesser extent. Both methods have been used to collect sexual behavior data in many diverse populations including young adults [42], female sex workers [43], and men who have sex with men (MSM) [44]. However, both methods have limitations. The advantages and disadvantages for each modality are discussed in further detail.

Selecting the most appropriate mode of data collection for sexual behavior research and the study population of interest is important since studies show that different modalities may affect the type and quality of data obtained [45, 46]. Several studies have examined the validity of sexual behavior data collected from a retrospective survey as compared to a prospective diary. Conducting these studies is important because the results could be used to guide which data collection modality is most appropriate for the study population of interest. The results of several of these comparison studies are presented.

Prospective Diary

There is currently no "gold standard" in the collection of sexual behavior data. The closest approximation to a "gold standard" is the sexual behavior diary [47, 48], as they minimize problems related to memory, and accurate and detailed reports on sexual behaviors are obtained due to contemporaneous data collection [49–51]. As discussed by Schroder *et al.* [48], an advantage to the diary is the short time frame in which the behavior is recorded in the diary following the actual occurrence of the behavior. Additionally, completing the diary takes a minimal amount of time and participants are able to decide when and where to complete the diary.

However, there are limitations to the use of a diary. Completing a diary on a regular basis could become tedious to study participants, especially over long periods of time [51]. Furthermore, participants may not be filling out the diary according to the specified time (e.g., daily), which could possibly introduce some retrospective bias. Since participants are completing the same questions on a regular basis, they may become more aware of their behaviors (reactivity), which may lead to changes in sexual or reporting behaviors over time [52]. Some participants have also expressed concerns about documenting their sexual behaviors in a diary in fear that it may be accidentally discovered by someone else [50].

Retrospective Survey

The retrospective self-completed survey is a common alternative to the diary for measuring sexual behaviors. There are many advantages to the survey including convenience and ease of administration [49, 51]. Surveys are cost effective and can be

administered to large groups of participants in one setting [49]. The survey is also easy

to complete and participants have a choice to skip over questions in which they feel

are too personally obtrusive. Additionally, studies show that participants may feel less

threatened about reporting their sexual behaviors in a survey compared to a face-to-

face interview [53].

One limitation to the survey is participants are asked to group their usual or

"average" behaviors into one category, which may not reflect behaviors that are

irregular or infrequent [54]. However, the biggest limitation is the increased possibility

of retrospective bias. Every person differs in their ability to remember past events, and

reliable reports of sexual behaviors may be influenced by the use of memory tools

(e.g., calendar), length of the recall [47], and the frequency of the sexual behavior

being assessed [48, 49]. In a study by Graham *et al.* [47], 75 heterosexual students

recorded their sexual behaviors, condom use, and alcohol and substance use on a daily

basis for 1 month. Participants were then randomized to recall these behaviors during

an interview at 1, 2, or 3 months. The authors found that total recall error for vaginal

intercourse was significantly greater at 3 months than at 1 month after the completion

of the diary. Furthermore, as demonstrated by Downey *et al.* [55], as the frequency of

sexual behaviors increased, so did the errors in recalling them.

Studies Comparing Reported Sexual Behaviors between a Prospective Diary and

Retrospective Survey

Several studies have compared the level of agreement of reported sexual

behaviors from a retrospective survey relative to a prospective diary. The general

methodology for these studies included the completion of a prospective diary, followed by the completion of a retrospective survey asking about behaviors that occurred during the same time frame as the diary. These studies found both over- [54, 56], and under-reporting [57, 58] of behaviors, with no obvious trend in direction [48]. For example, in a study conducted among 74 MSM, Coxon *et al.* concluded that survey data yielded consistently higher estimates of the number of sexual acts in comparison to data from the diaries [56]. About 55% of the survey estimates of the sexual acts were higher in the survey, relative to the diary counts. In another study of adolescents and adults aged 16–38, Leigh *et al.* found sexual activity was more frequently reported on the retrospective survey in comparison to the diary, but only among adolescents [54]. The mean difference between the two was also somewhat higher for those who had sex more often. Participants who had sex more than twice a week reported approximately 11% more occasions of intercourse on the survey than in the dairy (15.3 vs. 13.8).

However, other studies found under-reporting of sexual behaviors in the retrospective survey relative to the diary reports. In a study of 79 female sex workers in South Africa, Ramjee *et al.* found that a greater mean number of clients, number of condoms used, and number of sexual acts (anal and vaginal) were reported in the daily diary versus a retrospective survey [58]. In a more recent (2007) published study of 493 adults (heterosexual men and women, MSM) living in the US, McAuliffe *et al.* found that frequencies of sexual activity and condom use were more frequently under-reported in the retrospective survey relative to the diary [57]. About half of the participants reported fewer partners, 61% fewer occasions of anal or vaginal

intercourse, and 54% indicated unprotected sex less often in the retrospective survey. Among MSM, lower frequencies of anal intercourse and unprotected sex were reported in the retrospective survey.

Observed differences between the two methods could possibly be explained by the time lapse in which the survey was administered relative to the completion of the diary. Longer lapses in time between the two methods may influence the recall of reported behaviors [47]. The frequency of sexual behaviors may also explain some of the observed differences. Infrequent behaviors may be more easily remembered by participants [50] and recalled more accurately than frequent behaviors [56]. Recall error has been shown to increase with more frequent sexual behaviors [55]. Other reasons for discrepant findings include the sensitivity of the question asked, the content of the data collection tools, variations in the interpretation of the content by participants [59], and the use of different study populations (e.g., sex workers, college students, etc.).

References

1. Joint United Nations Programme on HIV/AIDS (UNAIDS). World AIDS Day Report. In. Geneva: UNAIDS/JC2216E; 2011.

2. Central Intelligence Agency. The World Factbook. In. Washington D.C.

3. Central Statistics Office & National AIDS Coordinating Agency. 2008 Botswana AIDS Impact Survey III. In. Gaborone: Central Statistics Office; 2009.

4. National AIDS Coordinating Agency. Botswana AIDS Impact Survey II - Popular Report, 2004. In: Republic of Botswana, Central Statistics Office; 2004.

5. UNAIDS. Report on the Global AIDS Epidemic. In: Joint United Nations Program on HIV/AIDS; 2008.

6. National AIDS Coordinating Agency (NACA). Progress Report of the National Response to the 2001 Declaration of Commitment on HIV and AIDS: Botswana Country Report 2010. In; 2010.

7. Whiteside A, de Waal A, Gebre-Tensae T. AIDS, security and the military in Africa: A sober appraisal. *African Affairs* 2006,105:201–218.

8. Newman LM, Miguel F, Jemusse BB, Macome AC, Newman RD. HIV seroprevalence among military blood donors in Manica Province, Mozambique. *Int J STD AIDS* 2001,12:225–228.

9. Azuonwu O, Erhabor O, Obire O. HIV among military personnel in the Niger Delta of Nigeria. *Journal of community health* 2012,37:25–31.

10. Berhe T, Gemechu H, de Waal A. War and HIV Prevalence. *African Security Review* 2005,143:107–114.

11. Anastario M, Manzanero R, Blanco R, Reyes E, Jaramillo R, Black L*, et al.* HIV infection, sexual risk behaviour and condom use in the Belize defense force. *International journal of STD & AIDS* 2011,22:73–79.

12. Department of Defense HIV/AIDS Prevention Program. 2010 Annual Report - Winning Battles in the War Against HIV/AIDS. In. San Diego: Naval Health Research Center; April 2011.

13. Carter MW, Kraft JM, Koppenhaver T, Galavotti C, Roels TH, Kilmarx PH, *et al.* "A bull cannot be contained in a single kraal": concurrent sexual partnerships in Botswana. *AIDS Behav* 2007,11:822–830.

14. Weiser SD, Leiter K, Heisler M, McFarland W, Percy-de Korte F, DeMonner SM, *et al.* A population-based study on alcohol and high-risk sexual behaviors in Botswana. *PLoS Med* 2006,3:e392.

15. Halperin DT, Epstein H. Concurrent sexual partnerships help to explain Africa's high HIV prevalence: implications for prevention. *Lancet* 2004,364:4–6.

16. Morris M, Kretzschmar M. Concurrent partnerships and the spread of HIV. *AIDS* 1997,11:641–648.

17. Pilcher CD, Tien HC, Eron JJ, Jr., Vernazza PL, Leu SY, Stewart PW, *et al.* Brief but efficient: acute HIV infection and the sexual transmission of HIV. *The Journal of infectious diseases* 2004,189:1785–1792.

18. Westercamp N, Mattson CL, Madonia M, Moses S, Agot K, Ndinya-Achola JO, *et al.* Determinants of consistent condom use vary by partner type among young men in Kisumu, Kenya: a multi-level data analysis. *AIDS Behav* 2010,14:949–959.

19. Macaluso M, Demand MJ, Artz LM, Hook EW, 3rd. Partner type and condom use. *AIDS* 2000,14:537–546.

20. Fisher JC, Bang H, Kapiga SH. The association between HIV infection and alcohol use: a systematic review and meta-analysis of African studies. *Sexually transmitted diseases* 2007,34:856–863.

21. Kalichman SC, Simbayi LC, Kaufman M, Cain D, Jooste S. Alcohol use and sexual risks for HIV/AIDS in sub-Saharan Africa: systematic review of empirical findings. *Prevention science : the official journal of the Society for Prevention Research* 2007,8:141–151.

22. Morojele NK, Kachieng'a MA, Mokoko E, Nkoko MA, Parry CD, Nkowane AM, *et al.* Alcohol use and sexual behaviour among risky drinkers and bar and shebeen patrons in Gauteng province, South Africa. *Social science & medicine* 2006,62:217–227.

23. Joint United Nations Programme on HIV/AIDS (UNAIDS). AIDS and the Military: UNAIDS Point of View. In. Geneva: UNAIDS; 1998.

24.   Miller N, Yeager R. By virtue of their occupation, soldiers and sailors are at greater risk. Special report: the military. *AIDS Anal Afr* 1995,5:8–9.

25.   Nwokoji UA, Ajuwon AJ. Knowledge of AIDS and HIV risk-related sexual behavior among Nigerian naval personnel. *BMC Public Health* 2004,4:24.

26.   Bing EG, Ortiz DJ, Ovalle-Bahamon RE, Cheng KG, Huang FH, Ernesto F*, et al.* HIV/AIDS behavioral surveillance among Angolan military men. *AIDS Behav* 2008,12:578–584.

27.   Okulate GT, Jones OB, Olorunda MB. Condom use and other HIV risk issues among Nigerian soldiers: challenges for identifying peer educators. *AIDS Care* 2008,20:911–916.

28.   Bakhireva LN, Abebe Y, Brodine SK, Kraft HS, Shaffer RA, Boyer CB. Human immunodeficiency virus/acquired immunodeficiency syndrome knowledge and risk factors in Ethiopian military personnel. *Mil Med* 2004,169:221–226.

29.   Heinecken L. Facing a Merciless Enemy: HIV/AIDS and the South African Armed Forces. *Armed Forces & Society* 2003,29:281–300.

30.   Allen S, Meinzen-Derr J, Kautzman M, Zulu I, Trask S, Fideli U*, et al.* Sexual behavior of HIV discordant couples after HIV counseling and testing. *AIDS* 2003,17:733–740.

31.   Laurian Y, Peynet J, Verroust F. HIV infection in sexual partners of HIV-seropositive patients with hemophilia [letter]. *N Engl J Med* 1989,320:183.

32.   Saracco A, Musicco M, Nicolosi A, Angarano G, Arici C, Gavazzeni G*, et al.* Man-to-woman sexual transmission of HIV: longitudinal study of 343 steady partners of infected men. *Journal of acquired immune deficiency syndromes* 1993,6:497–502.

33.   de Vincenzi I. A longitudinal study of human immunodeficiency virus transmission by heterosexual partners. European Study Group on Heterosexual Transmission of HIV. *N Engl J Med* 1994,331:341–346.

34.   Weller SC. A meta-analysis of condom effectiveness in reducing sexually transmitted HIV. *Social science & medicine* 1993,36:1635–1644.

35.   Pinkerton SD, Abramson PR. Effectiveness of condoms in preventing HIV transmission. *Social science & medicine* 1997,44:1303–1312.

36.   Davis KR, Weller SC. The effectiveness of condoms in reducing heterosexual transmission of HIV. *Fam Plann Perspect* 1999,31:272–279.

37.   Department of Defense HIV AIDS Prevention Program. 2009 Botswana Defence Force HIV Seroprevalence and Behavioral Epidemiology Risk Survey (SABERS). In. San Diego: Naval Health Research Center; 2011 - Unpublished work.

38.   Baser M, Tasci S, Albayrak E. Commandos do not use condoms. *Int J STD AIDS* 2007,18:823–826.

39.   Ortiz DJ, Bing EG, Boyer CB, Russak SM, De Deus FJ, Ernesto F. Evidence-based recommendations for prevention of human immunodeficiency virus and sexually transmitted infections in the Angolan Armed Forces: challenges and opportunities at the end of 30 years of war. *Mil Med* 2005,170:327–332.

40.   Essien EJ, Ogungbade GO, Kamiru HN, Ekong E, Ward D, Holmes L, Jr. Emerging sociodemographic and lifestyle predictors of intention to use condom in human immunodeficiency virus intervention among uniformed services personnel. *Mil Med* 2006,171:1027–1034.

41.   Holmes L, Jr., Ogungbade G, Ward DD, Ross MW, Ekong E, Essien EJ. Epidemiologic and behavioral characterization of knowledge of condom use and modeling among military personnel. *African journal of reproductive health* 2008,12:32–44.

42.   Hoffman S, O'Sullivan LF, Harrison A, Dolezal C, Monroe-Wise A. HIV risk behaviors and the context of sexual coercion in young adults' sexual interactions: results from a diary study in rural South Africa. *Sexually transmitted diseases* 2006,33:52–58.

43.   Voeten HA, Egesah OB, Varkevisser CM, Habbema JD. Female sex workers and unsafe sex in urban and rural Nyanza, Kenya: regular partners may contribute more to HIV transmission than clients. *Tropical medicine & international health : TM & IH* 2007,12:174–182.

44.   Saltzman SP, Stoddard AM, McCusker J, Moon MW, Mayer KH. Reliability of self-reported sexual behavior risk factors for HIV infection in homosexual men. *Public Health Rep* 1987,102:692–697.

45.   Tourangeau R, Smith TW. Asking sensitive questions - The impact of data collection mode, question format, and question context. *Public Opinion Quarterly* 1996,60:275–304.

46. Bowling A. Mode of questionnaire administration can have serious effects on data quality. *Journal of public health* 2005,27:281–291.

47. Graham CA, Catania JA, Brand R, Duong T, Canchola JA. Recalling sexual behavior: a methodological analysis of memory recall bias via interview using the diary as the gold standard. *Journal of sex research* 2003,40:325–332.

48. Schroder KE, Carey MP, Vanable PA. Methodological challenges in research on sexual risk behavior: II. Accuracy of self-reports. *Annals of behavioral medicine : a publication of the Society of Behavioral Medicine* 2003,26:104–123.

49. Catania JA, Gibson DR, Chitwood DD, Coates TJ. Methodological problems in AIDS behavioral research: influences on measurement error and participation bias in studies of sexual behavior. *Psychological bulletin* 1990,108:339–362.

50. McLaws M, Oldenburg B, Ross M, Cooper D. Sexual behaviour in AIDS-related research: Reliability and validity of recall and diary measures. *The Journal of Sex Research* 1990,27:265–281.

51. Weinhardt LS, Forsyth AD, Carey MP, Jaworski BC, Durant LE. Reliability and validity of self-report measures of HIV-related sexual behavior: progress since 1990 and recommendations for research and practice. *Archives of sexual behavior* 1998,27:155–180.

52. Reading A. A comparison of the accuracy and reactivity of methods monitoring male sexual behavior. *Journal of Psychopathology and Behavioral Assessment* 1983,5:11–23.

53. Catania J, McDermott L, Pollack L. Questionnaire response bias and face-to-face interview sample bias in sexuality research. *Journal of sex research* 1986,22:52–72.

54. Leigh BC, Gillmore MR, Morrison DM. Comparison of diary and retrospective measures for recording alcohol consumption and sexual activity. *J Clin Epidemiol* 1998,51:119–127.

55. Downey L, Ryan R, Kulich M. How Could I Forget? Inaccurate memories of sexually intimate moments. *The Journal of Sex Research* 1995,32:177–191.

56. Coxon AP. Parallel accounts? Discrepancies between self-report (diary) and recall (questionnaire) measures of the same sexual behaviour. *AIDS Care* 1999,11:221–234.

57. McAuliffe TL, DiFranceisco W, Reed BR. Effects of question format and collection mode on the accuracy of retrospective surveys of health risk behavior: a comparison with daily sexual activity diaries. *Health Psychol* 2007,26:60–67.

58. Ramjee G, Weber AE, Morar NS. Recording sexual behavior: comparison of recall questionnaires with a coital diary. *Sex Transm Dis* 1999,26:374–380.

59. Hoppe MJ, Morrison DM, Gillmore MR, Beadnell B, Higa DH, Leigh BC. Agreement of daily diary and retrospective measures of condom use. *AIDS Behav* 2008,12:113–117.

CHAPTER 2

A Cross-sectional Analysis of Condom Use Behaviors and Correlates of Condom Use

in the Botswana Defence Force

Abstract:

Background: Few studies have examined condom use behaviors among military personnel. Research investigating condom use behaviors and correlates of condom use in this population is needed to better monitor existing HIV prevention programs, identify areas that need modification, and develop new interventions. This study describes condom use behaviors and examines correlates of condom use in the Botswana Defence Force (BDF).

Methods and Findings: From October 2010–April 2011, 211 sexually-active men, aged 18–30 years, participated in a condom-wrapper graphic intervention study conducted in the BDF. Results from the baseline survey showed that approximately 51% of participants reported always using condoms, 35% used condoms most times, and 14% reported using condoms occasionally/never. Higher levels of HIV knowledge and being circumcised were associated with more frequent condom use. Factors associated with lower condom use included excessive alcohol use, having a trusted partner, and perceiving that using condoms reduce sexual pleasure.

Conclusions: Condom use was relatively low in the BDF, with only about half of participants reporting always using condoms. HIV interventions aimed at increasing condom use in the BDF should address alcohol abuse, beliefs about condoms, and issues of trust.

Introduction

Botswana has one of the highest HIV prevalence in the world, with a national estimate of 17.6% [1] and a prevalence of 24.8% among adults aged 15–49 [2]. While the HIV epidemic in Botswana is generalized, there is concern that military personnel may be particularly vulnerable due to unique circumstances that surround military service. They are predominately young, susceptible to peer pressure [3, 4], and highly mobile. To relieve stress and loneliness during deployments, soldiers may engage in risky sexual behaviors, such as having unprotected sex with sex workers [5, 6]. Military personnel may also be deployed to regions with high HIV prevalence, increasing the opportunity for those engaged in risky sexual behaviors to be exposed to HIV. Furthermore, studies have found high HIV risk-taking behaviors among military personnel, including having multiple sexual partners and alcohol abuse [7–9].

There is overwhelming evidence that condoms are highly effective in preventing HIV if used correctly and consistently [10–12]. However, consistent condom use among military personnel has generally been reported to be very low. For example, studies in the Nigerian military showed that consistent condom use was only found in 16–20% of participants [9], and among those who have reported ever having sex with a sex worker, 41% did not use a condom the last time they had sex with that partner type [6]. In the Belize Defense Force, among soldiers who reported ever having sex with a sex worker, 18.8% did not use a condom the last time they had sex with that partner type [13]. Partner type may also influence condom use, with studies

typically reporting lower condom use with regular partners than with causal partners [8].

Few studies have examined predictors of condom use among military personnel [14, 15]. As condom use behaviors may differ by militaries, research within each is needed to properly characterize these behaviors, evaluate the effectiveness of existing HIV prevention programs, and identify key program areas that need targeting or modification. In addition, more current research will allow the evaluation of changes in condom use behaviors. The purpose of this cross-sectional analysis is to describe current condom use behaviors and examine condom use correlates in the Botswana Defence Force (BDF).

Methods

Study Design and Participants

From October 2010–April 2011, a non-randomized intervention study was conducted to examine the effect of condom-wrapper graphics and scent on condom use in the BDF. The findings of this cross-sectional analysis are drawn from baseline data. Participants were sexually-active male BDF military personnel, aged 18–30 years, and stationed at four selected military sites. Participant recruitment was accomplished through the use of flyers, command newsletters, and regular military communication channels. Interested military personnel attended an informational briefing where the study purpose and objectives were explained. Prior to consenting, individuals were given an opportunity to ask questions about their possible participation. A total of 211 men (81.2%), of a target sample size of 260, agreed to

participate and provided written informed consent. Institutional review boards in the United States (Naval Health Research Center and San Diego State University, San Diego, California) and Botswana (Ministry of Health, Gaborone, Botswana) approved the study prior to data collection.

Study Procedures

Study personnel briefed interested individuals on the study purpose and conducted the written informed consent process. Consented participants self-completed a paper-based survey that was administered in a group setting with participants sitting at least arm's length apart. Questions were read out loud by a trained survey administrator while participants followed along and marked responses on their surveys. The baseline survey was adapted from previous surveys administered in the BDF and other militaries, and collected demographics (age, marital status, educational level, religion, military rank and unit, years of military service), sexual behavior history, condom use frequency, attitudes, and behaviors, HIV risk perception, HIV knowledge, alcohol use, and circumcision status.

Correlates of Interest

Sexual history correlates included age at sexual debut, number of lifetime partners, number of regular and casual partners in the past 12 months, and more than one sexual partner in the past 3 months (no/yes). HIV risk perception correlates included knowledge of one's HIV status (no/yes), knowledge of others in the unit known to have HIV (no/yes), and ever cared for or lived with someone with HIV/AIDS (no/yes). Participants were tested on their HIV knowledge with a series of eight questions: five were based on the United Nations General Assembly Special

Session (UNGASS) on HIV/AIDS core indicators [16], and three were locally adapted. Questions were about HIV transmission (through mosquito bites, witchcraft/supernatural means, traditional practices, sharing a meal with an infected person), HIV prevention (having one faithful uninfected partner, using condoms, abstinence), and general knowledge about HIV (a healthy looking person can have HIV). The HIV knowledge score was defined as the percent of questions correctly answered. This score was computed for participants who were not missing any knowledge questions.

Circumcision status was self-reported as circumcised or not circumcised and alcohol use was measured using the Alcohol Use Disorders Identification Test (AUDIT). The AUDIT has been validated in several countries world-wide, including those in Africa [17], and has been previously used in African military personnel [8]. The AUDIT consists of 10 questions that measure alcohol use, including harmful and hazardous drinking and alcohol dependence. Responses to each question were scored on a range of 0–4 and were summed for a composite score ranging from 0–40. Non-drinkers were categorized as those having an AUDIT score of 0, mild drinkers had a score of less than 8, and problem drinkers were defined as those with a score of 8 or higher. Participants who were missing all AUDIT questions ($n = 1$) and those missing several questions from the AUDIT but had a computed score bordering problem drinking were excluded from analysis ($n = 3$).

Participants were asked to provide their opinions (agree, disagree, or don't know) about condom use on a total of 10 statements. Denominators for each statement

varied and only included those who agreed or disagreed; those who responded "don't know" were excluded. Participants were also asked to provide reasons for not using condoms, such as condoms make sex less enjoyable, condoms break easily, condoms smell bad, condoms don't fit properly, I trust my partner(s), condoms dampen the mood, I don't have the right brand, partner(s) doesn't want me to use one, and other reported reasons. Lastly, participants were also asked to indicate how often (always, most times, occasionally, never) they carry condoms with them, such as in their uniform or wallet.

Outcome Measures

The outcome of interest was condom use frequency in the last 3 months defined as always, most times, occasionally, or never using condoms. The categories occasionally and never were collapsed into one category due to few responses in each group.

Statistical Analysis

Descriptive statistics were computed, including frequencies and percentages for categorical variables and means and standard deviations, or medians and ranges, for continuous variables. Univariate ordinal regression analysis was used to examine the relation of each correlate of interest with the outcome of condom use frequency, defined as the odds of decreasing condom use. Variables significant at $p \leq 0.15$ were examined further in individual ordinal models adjusting for continuous age and marital status, as these covariates have been found to be significantly associated with condom use [18, 19]. All variables significant at $p \leq 0.15$ were entered into a backwards selection regression model, which also adjusted for age and marital status. The

Likelihood Ratio test was used to determine whether a variable was kept in the model at each step of the elimination process. A two-tailed $p < 0.05$ was used to determine statistical significance in the Likelihood Ratio test and the final multivariate regression model. The proportional odds assumption was satisfied for all models. Multicollinearity was assessed by examining the variance inflation factor (VIF) and tolerance values; no variables in the model were determined to be collinear. Logistic regression analyses were also performed treating condom use frequency as a binary outcome in two separate models: 1) occasional/never vs. most times/always and 2) occasional/never/most times vs. always. All statistical analyses were performed using SAS statistical software version 9.3 (SAS Institute, Cary, NC).

Results

Demographic characteristics are presented in Table 2.1. The mean age was 25.1 years and ranged from 21–30. Most participants (82.0%) were single, never married, had completed at least senior secondary school (equivalent to high school) (74.4%), and of Christian faith (82.5%). The majority (51.2%) were ranked Private and in the Fighting (36.2%) or Logistics unit (34.8%). The mean years of military service was 4.1 years.

Characteristics of condom use correlates are presented in Table 2.2. The mean age of sexual debut was 17.5 years. The median lifetime number of partners was 10.0, and the median total number of regular and casual partners in the past 12 months was 3.0. Approximately 70% reported having more than one sexual partner in the past 3 months. Most (75.2%) participants knew their HIV status. A little under half (47.1%)

of participants knew someone in their unit who was HIV-positive, and about 40% had ever cared or lived with an HIV-positive person. The majority (75.4%) scored 85% or higher on the HIV knowledge questions, with a mean score of 87.9%. When examining circumcision status, 21.9% reported they were circumcised. Over half (58.9%) of the participants were defined as problem drinkers according to their AUDIT score. Among those who reported drinking in the last 3 months (AUDIT score greater than 0), 16.7% of participants indicated alcohol use prevented condom use and 8.1% reported alcohol use prevented correct condom use (data not shown). Most participants had a positive attitude towards condoms, with 74.3% agreeing that condoms are quite convenient to use and 90.9% agreeing that condoms are effective in preventing HIV infection. Most also agreed it was alright for women and men to ask their spouse to use a condom (98.0% and 97.5%, respectively), and that using a condom showed you cared for your sexual partner (99.0%). The most commonly reported reason for not using condoms was condoms make sex less enjoyable (17.5%), reported trust for a sexual partner (13.7%), and condoms smell bad (6.2%). Few (9.1%) reported always carrying condoms with them.

Frequency of condom use is presented in Figure 2.1. Approximately 51.2% of participants reported always using condoms, 35.1% reported using condoms most times, and 13.7 % reported using condoms occasionally/never. Among 54 participants with one regular partner, 51.9% reported always using condoms with this partner. Of 9 participants with one casual partner, 77.8% reported always using condoms with that partner. Of 79 participants with one casual and one regular partner, 84.8% reported

always using condoms with their casual partner, while only 40.5% reported always using condoms with their regular partner (data not shown).

Table 2.3 reports associations between correlates of interest and decreasing condom use in unadjusted and adjusted models (controlling for age and marital status). In unadjusted models, correlates of decreasing condom use (at $p = 0.15$ level of significance) included HIV knowledge score, circumcision status, alcohol use, several opinions about condom use (condoms are quite convenient to use, condoms are effective in preventing HIV infection, a woman would lose respect if she asked a man to use a condom), and reported reasons for not using condoms (condoms make sex less enjoyable, condoms break easily, condoms smell bad, I trust my partner(s), I don't have the right brand). All variables remained significant at $p = 0.15$ after adjusting for age and marital status, with the exception of the variable condoms are quite convenient to use ($p = 0.18$). Only variables with $p \leq 0.15$ were introduced into the final model.

Results from the final multivariate model, which used backward selection, are presented in Table 2.4. After adjusting for all variables in the model, HIV knowledge score, circumcision status, alcohol use, and two reported reasons for not using condoms (condoms make sex less enjoyable and I trusted my partner) were identified as significant correlates of condom use. For every one unit increase in the HIV knowledge score, the odds of decreasing condom use were lowered by 3.0% (OR = 0.97, 95% CI = 0.95–0.99). The odds of decreasing condom use were also lowered by 58% among those who reported being circumcised (OR = 0.42, 95% CI = 0.20–0.90). Alcohol use was strongly associated with decreasing condom use. The odds of

decreasing condom use were 2.27 times higher among problem drinkers compared with non/mild drinkers (95% CI = 1.22–4.23). After adjusting for other variables in the model, the odds of decreasing condom use were almost four times higher among participants who indicated that condoms make sex less enjoyable (OR = 4.06, 95% CI = 1.83–9.03) and among those who reported not using condoms due to trusting their sexual partner (OR = 3.76, 95% CI = 1.64–8.65). Similar associations were observed from the logistic regression models (data not shown).

Discussion

Results from the analysis of baseline data showed that the frequency of condom use was relatively low in the BDF, with only 51% of participants reporting always using condoms. Condom use was generally higher with casual partners than with regular partners, which is consistent with other studies [8, 20, 21]. However, while we may be encouraged by the higher percentage of participants reporting condom use with their casual partners, this percentage is still not 100%. Military personnel in multiple sexual partnerships who are not consistently using condoms place themselves and their partners at higher risk for HIV infection.

The high percentage (59%) of problem alcohol use in the BDF, and its association with lower levels of condom use and prevention of condom use raises concern. Estimates of problem alcohol use (59%) are much higher than those reported in the general male Botswanan population of comparable mean age (39%) [22]. BDF HIV prevention messages should address alcohol abuse and risky behaviors, to include refraining from excessive alcohol use before sex and reinforcing the need for correct and consistent condom use. Other potential preventive measures include supporting

the current Botswana government initiatives in increasing tax on alcoholic purchases, limiting alcohol availability on the military bases, and providing free condoms where alcohol is sold. In addition, the BDF should bolster and increase alcohol abuse prevention, treatment, and rehabilitation programs within their military.

Lower condom use was found among participants who indicated that condoms make sex less enjoyable. It may be that participants prefer skin-to-skin contact or the act of putting on a condom dampens sexual mood. Furthermore, there could be physical attributes of the condom that discourages use. As observed in this study, lower condom use was univariately associated with the belief that condoms smell bad. These results have important implications regarding condom use in the BDF, as anecdotal reports suggest that the government-issued condoms are often not used due to an unpleasant scent. Therefore, while most (82%) agreed that they would use condoms more often if they were available for free, they may not be using the government-issued condoms because of the unpleasant odor. The BDF should consider providing a condom that is appealing to their members, which may increase use. Further qualitative research examining why condoms reduce sexual pleasure among this population is also needed.

The significant association between reporting trust for a sexual partner and lower condom use was interesting. Issues of trust and condom use have been explored extensively in the general population [23–27], but few studies have investigated this in military populations [28]. Although nearly 100% of participants agreed that using a condom shows you care for your partner, results show that most were not using condoms consistently, since suggesting condom use could indicate that a partner has

not been faithful or is not committed to the relationship. Further qualitative studies should be undertaken to explore trust issues and condom use in the BDF. The BDF should also encourage couples HIV counseling and testing, so that individuals and their partners know their HIV status, and support disclosure of HIV status to all sexual partners.

Although not statistically significant, highly elevated odds of lower condom use were observed among those who agreed with the statement that a woman would lose respect if she asked a man to use a condom, suggesting condom use may be stigmatized among BDF military personnel. However, this observation was only based on three affirmative responses, explaining the wide confidence intervals that were observed. This variable was kept in the final multivariate model based on Likelihood Ratio test results. With a larger sample size, this variable may have been identified as a significant correlate and more precise estimates may have been observed.

Consistent with other studies, higher levels of HIV knowledge were found to be associated with more frequent condom use [29, 30]. Elevated levels of HIV knowledge observed in this study population may be an indication that the BDF HIV educational programs have been highly effective, and are reaching the younger populations, in which such programs may have the most impact. However, studies show that HIV knowledge does not necessarily translate into actual practice of safe sexual behaviors [31]. While nearly 100% of participants correctly answered that HIV transmission can be reduced by using condoms, only 51% reported always using condoms, suggesting that HIV knowledge alone is not enough to prevent HIV

infection. HIV prevention and transmission education should be coupled with messages of correct and consistent condom use.

Lastly, the finding of increased condom use among men who reported they were circumcised is promising, since there is concern that circumcised men may practice more risky sexual behaviors following male circumcision (MC), as their perception of HIV risk may be falsely reduced. These results are similar to those reported in other studies [32] and suggest that BDF prevention messages regarding correct and consistent condom use after MC may be highly effective. The BDF should continue to promote consistent condom use after MC.

Limitations to this study include the cross-sectional study design and the original target sample size was not reached by 49 participants, which may have affected the study power. Due to strict participant eligibility criteria, the study results may only be generalizable to BDF members of comparable age. Although not all BDF sites were included in the study, the four that were selected contained the largest number of BDF personnel of diverse backgrounds. Respondent bias may also have been an issue, with participants providing socially desirable responses. However, confidentiality measures were in place to ensure privacy during survey administration and participants were informed they could skip any questions they did not feel comfortable answering. In addition, as the survey was self-completed and not interview-based, participants may have felt more comfortable providing accurate responses. Despite these limitations, there were also many study strengths including the fact that many different correlates of condom use were examined, participation

rates were high, and there was very little missing data from the baseline survey—which allowed more complete and thorough statistical analysis.

To our knowledge, this is the first paper to examine condom use behaviors and condom use correlates in the BDF. The BDF should strongly emphasize the importance of correct and consistent condom use with all partner types, and integrate alcohol abuse into their HIV prevention programs. The association between trust and condom use should be addressed further, and innovative ways to increase condom use among those in trusted relationships should be explored. As the results of this study may be unique to the BDF, further studies in other militaries should be conducted to better understand condom use behaviors in each military and to tailor HIV prevention programs. As the HIV epidemic continues to grow, prevention efforts aimed at military personnel should be strongly emphasized to keep this high-risk population healthy.

Acknowledgments

Table 2.1 Demographic characteristics of 211 study participants

Variable	n	(%)
Age in years, Mean (SD)	25.1	(2.4)
Marital status		
Single, never married	173	(82.0)
Married	2	(1.0)
Cohabitating	36	(17.0)
Education		
Primary	0	(0)
Junior secondary	1	(0.4)
Senior secondary	157	(74.4)
Tertiary	44	(20.9)
Vocational	9	(4.3)
Religion		
Christian	174	(82.5)
Traditional	10	(4.7)
African Traditional	7	(3.3)
No religious affiliation	19	(9.0)
Other non-Christian	1	(0.5)
Military rank		
Private	108	(51.2)
Junior NCO[a]	92	(43.6)
Warrant Officer/Senior NCO[a]	0	(0)
Junior Officer	11	(5.2)
Military unit[b]		
Air Arm	0	(0)
Fighting	76	(36.2)
Logistics	73	(34.8)
Support	60	(28.6)
Cadets	0	(0)
Trainers	1	(0.4)
Years in the military, Mean (SD)	4.1	(2.4)

[a]Non-commissioned officer

[b]Excludes one participant with a missing response

Table 2.2 Characteristics of condom use correlates of 211 study participants

Variable[a]	n	(%)
Sexual history		
Age at first sexual debut in years, Mean (SD)	17.5	(2.7)
No. lifetime partners, Median (Range)	10.0	(5–200)
No. regular partners in past 12 months, Median (Range)	3.0	(1–35)
No. casual partners in past 12 months, Median (Range)	3.0	(1–115)
More than one sexual partner in past 3 months	143	(69.1)
HIV risk perception and knowledge of HIV		
Knowledge of HIV status	155	(75.2)
Knowledge of someone in unit with HIV/AIDS	49	(47.1)
Ever cared for or lived with an HIV-positive person	80	(40.4)
Scored 85% or higher on HIV knowledge questions[b]	159	(75.4)
HIV knowledge score, Mean (SD)	87.9	(12.5)
Circumcision status		
Uncircumcised	164	(78.1)
Circumcised	46	(21.9)
Alcohol use		
Non-drinkers (AUDIT = 0)	51	(24.6)
Mild drinkers (AUDIT < 8)	34	(16.4)
Problem drinkers (AUDIT $\geq$ 8)	122	(58.9)
Opinions about condoms[c]		
Using a condom shows you care for your partner	204	(99.0)
It is alright for a married woman to ask her husband to use a condom	195	(98.0)
It is alright for a married man to use a condom with his wife	197	(97.5)
Condoms are effective in preventing HIV infection	189	(90.9)
I would use condoms more often if they were available for free	159	(81.5)
Condoms are quite convenient to use	136	(74.3)
Buying and handling condoms is the man's responsibility	55	(26.3)
It is embarrassing to buy condoms	25	(12.1)
One condom can be used more than once	4	(1.9)
A man would lose respect if he suggested to a woman that they use a condom	3	(1.5)
A woman would lose respect if she asked a man to use a condom	3	(1.5)

Table 2.2 Characteristics of condom use correlates, Continued

Variable[a]	n	(%)
Reported reasons for not using condoms		
Condoms make sex less enjoyable	37	(17.5)
I trust my partner(s)	29	(13.7)
Condoms smell bad	13	(6.2)
Condoms dampen the mood	11	(5.2)
Other reasons	7	(3.3)
Condoms break easily	4	(1.9)
Partner does not want me to use one	4	(1.9)
Condoms don't fit properly	3	(1.4)
I don't have the right brand	3	(1.4)
Frequency of carrying condoms		
Always	19	(9.1)
Most times	40	(19.1)
Occasionally	79	(37.8)
Never	71	(34.0)

[a]Excludes participants with missing responses

[b]Percentage of correct responses to eight HIV knowledge questions: HIV can be prevented by having sex with one faithful uninfected partner (94.8%), by using condoms (99.5%), and remaining abstinent (91.0%). A healthy looking person can have HIV (98.1%). HIV cannot be transmitted through mosquito bites (86.3%), witchcraft/supernatural means (76.8%), or by sharing a meal with an infected person (96.2%). HIV can be transmitted through traditional practices (60.2%)

[c]Agreement with each statement

Table 2.3 Unadjusted and adjusted associations of condom use correlates with decreasing condom use frequency

Variable	Univariate model			Adjusted model[a]		
	Odds ratio	(95% CI)[b]	p-value	Odds ratio	(95% CI)[b]	p-value
HIV knowledge score	0.98	(0.96–1.00)	0.06	0.98	(0.96–1.00)	0.08
Circumcision status						
Not circumcised	1.0			1.0		
Circumcised	0.53	(0.27–1.03)	0.06	0.53	(0.27–1.03)	0.06
Alcohol use						
Non/mild drinkers (AUDIT < 8)	1.0			1.0		
Problem drinkers (AUDIT $\geq$ 8)	2.67	(1.52–4.70)	<0.001	2.73	(1.54–4.84)	<0.001
Opinions about condoms						
Condoms are quite convenient to use						
Agree	1.0			1.0		
Disagree	1.68	(0.89–3.16)	0.11	1.55	(0.81–2.98)	0.18
Condoms are effective in preventing HIV						
Agree	1.0			1.0		
Disagree	2.07	(0.82–5.22)	0.13	1.99	(0.78–5.06)	0.15
A woman would lose respect if she asked a man to use a condom						
Disagree	1.0			1.0		
Agree	5.29	(0.61–45.65)	0.13	6.13	(0.70–53.64)	0.10

Table 2.3 Associations of condom use correlates with decreasing condom use frequency, Continued

Variable	Univariate model			Adjusted model[a]		
	Odds ratio	(95% CI)[b]	p-value	Odds ratio	(95% CI)[b]	p-value
Reported reasons for not using condoms						
Condoms make sex less enjoyable						
No	1.0			1.0		
Yes	5.75	(2.83–11.69)	<0.001	5.42	(2.65–11.11)	<0.001
Condoms break easily						
No	1.0			1.0		
Yes	4.42	(0.69–28.23)	0.12	5.34	(0.82–34.89)	0.08
Condoms smell bad						
No	1.0			1.0		
Yes	3.40	(1.19–9.77)	0.023	3.30	(1.13–9.59)	0.029
I trust my partners(s)						
No	1.0			1.0		
Yes	4.75	(2.21–10.18)	<0.001	4.79	(2.22–10.31)	<0.001
I don't have the right brand						
No	1.0			1.0		
Yes	5.33	(0.62–45.88)	0.13	5.83	(0.67–50.93)	0.11

[a]Adjusted for age and marital status

[b]95% confidence intervals; estimates may be wide due to small samples

Table 2.4 Multivariate ordinal regression model examining the association between correlates of condom use and decreasing condom use frequency

Variable	Odds ratio	(95% CI)[b]	p-value
	Decreasing odds of using condoms[a]		
	(N = 192)		
Age in years	0.92	(0.81–1.06)	0.20
Marital status			
Single	1.0		
Married	2.15	(0.96–4.80)	0.06
HIV knowledge score	0.97	(0.95–0.99)	0.040
Circumcision status			
Not circumcised	1.0		
Circumcised	0.42	(0.20–0.90)	0.026
Alcohol use			
Non/mild drinkers (AUDIT < 8)	1.0		
Problem drinkers (AUDIT ≥ 8)	2.27	(1.22–4.23)	0.010
Opinions about condoms			
A woman would lose respect if she asked a man to use a condom			
Disagree	1.0		
Agree	8.73	(0.73–103.85)	0.09
Reported reasons for not using condom			
Condoms make sex less enjoyable			
No	1.0		
Yes	4.06	(1.83–9.03)	<0.001
I trust my partner(s)			
No	1.0		
Yes	3.76	(1.64–8.65)	0.002

[a]Adjusted for age, marital status, and other variables in the model

[b]95% confidence intervals; estimates may be wide due to small samples
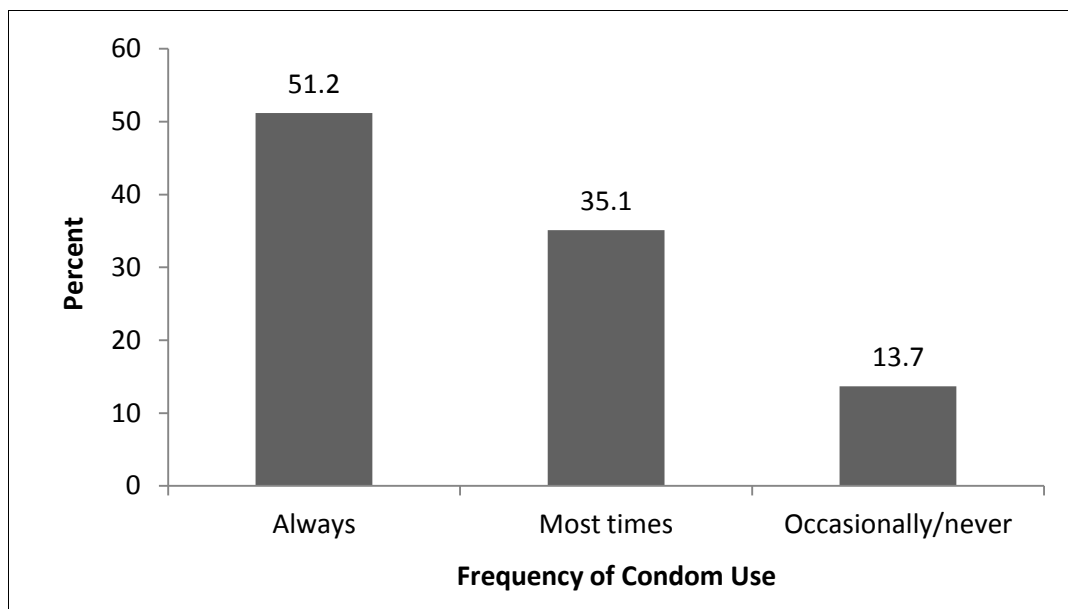
Figure 2.1 Study participants' reported condom use frequency in the past 3 months (N = 205)

References

1.   Central Statistics Office & National AIDS Coordinating Agency. 2008 Botswana AIDS Impact Survey III. In. Gaborone: Central Statistics Office; 2009.

2.   Joint United Nations Programme on HIV/AIDS (UNAIDS) & World Health Organization (WHO). AIDS Epidemic Update. In. Geneva: UNAIDS/09.36E/JC1700E; 2009.

3.   Joint United Nations Programme on HIV/AIDS (UNAIDS). AIDS and the Military: UNAIDS Point of View. In. Geneva: UNAIDS; 1998.

4.   Miller N, Yeager R. By virtue of their occupation, soldiers and sailors are at greater risk. Special report: the military. *AIDS Anal Afr* 1995,5:8–9.

5.   Heinecken L. Facing a Merciless Enemy: HIV/AIDS and the South African Armed Forces. *Armed Forces & Society* 2003,29:281–300.

6.   Nwokoji UA, Ajuwon AJ. Knowledge of AIDS and HIV risk-related sexual behavior among Nigerian naval personnel. *BMC Public Health* 2004,4:24.

7.   Bakhireva LN, Abebe Y, Brodine SK, Kraft HS, Shaffer RA, Boyer CB. Human immunodeficiency virus/acquired immunodeficiency syndrome knowledge and risk factors in Ethiopian military personnel. *Mil Med* 2004,169:221–226.

8.   Bing EG, Ortiz DJ, Ovalle-Bahamon RE, Cheng KG, Huang FH, Ernesto F*, et al.* HIV/AIDS behavioral surveillance among Angolan military men. *AIDS Behav* 2008,12:578–584.

9.   Okulate GT, Jones OB, Olorunda MB. Condom use and other HIV risk issues among Nigerian soldiers: challenges for identifying peer educators. *AIDS Care* 2008,20:911–916.

10.   Davis KR, Weller SC. The effectiveness of condoms in reducing heterosexual transmission of HIV. *Fam Plann Perspect* 1999,31:272–279.

11.   Pinkerton SD, Abramson PR. Effectiveness of condoms in preventing HIV transmission. *Social science & medicine* 1997,44:1303–1312.

12.   Weller SC. A meta-analysis of condom effectiveness in reducing sexually transmitted HIV. *Social science & medicine* 1993,36:1635–1644.

13.   Anastario M, Manzanero R, Blanco R, Reyes E, Jaramillo R, Black L*, et al.* HIV infection, sexual risk behaviour and condom use in the Belize defense force. *International journal of STD & AIDS* 2011,22:73–79.

14.   Essien EJ, Ogungbade GO, Kamiru HN, Ekong E, Ward D, Holmes L, Jr. Emerging sociodemographic and lifestyle predictors of intention to use condom in human immunodeficiency virus intervention among uniformed services personnel. *Mil Med* 2006,171:1027–1034.

15.   Holmes L, Jr., Ogungbade G, Ward DD, Ross MW, Ekong E, Essien EJ. Epidemiologic and behavioral characterization of knowledge of condom use and modeling among military personnel. *African journal of reproductive health* 2008,12:32–44.

16.   Joint United Nations Programme on HIV/AIDS (UNAIDS). Monitoring the Declaration of Committment on HIV/AIDS : guidelines on construction of core indicators : 2010 reporting. In. Geneva: UNAIDS/07.12E / JC1318E; 2009.

17.   Babor T, Higgins-Biddle J, Saunders J, Monteiro M. The Alcohol Use Disorders Identification Test (AUDIT). In: World Health Organization; 2001.

18.   Kapiga SH, Lugalla JL. Male condom use in Tanzania: results from a national survey. *East Afr Med J* 2003,80:181–190.

19.   Mnyika KS, Klepp KI, Kvale G, Ole-Kingori N. Determinants of high-risk sexual behaviour and condom use among adults in the Arusha region, Tanzania. *Int J STD AIDS* 1997,8:176–183.

20.   Macaluso M, Demand MJ, Artz LM, Hook EW, 3rd. Partner type and condom use. *AIDS* 2000,14:537–546.

21.   Westercamp N, Mattson CL, Madonia M, Moses S, Agot K, Ndinya-Achola JO*, et al.* Determinants of consistent condom use vary by partner type among young men in Kisumu, Kenya: a multi-level data analysis. *AIDS Behav* 2010,14:949–959.

22.   Weiser SD, Leiter K, Heisler M, McFarland W, Percy-de Korte F, DeMonner SM*, et al.* A population-based study on alcohol and high-risk sexual behaviors in Botswana. *PLoS Med* 2006,3:e392.

23.   Agha S, Kusanthan T, Longfield K, Klein M, Berman J. Reasons for non-use of condoms in eight countries in sub-Saharan Africa. In: Population Services International; 2002.

24.   Longfield K, Klein M, Berman J. Multi-country study on trusted partners among youth: Eritrea, Tanzania, Zambia, and Zimbabwe. In: Population Services International; 2005.

25.   Marston C, King E. Factors that shape young people's sexual behaviour: a systematic review. *Lancet* 2006,368:1581–1586.

26.   Brady SS, Tschann JM, Ellen JM, Flores E. Infidelity, trust, and condom use among Latino youth in dating relationships. *Sexually transmitted diseases* 2009,36:227–231.

27.   Maharaj P, Cleland J. Condom use within marital and cohabiting partnerships in KwaZulu-Natal, South Africa. *Studies in family planning* 2004,35:116–124.

28.   Mankayi N. Military men and sexual practices: discourses of 'othering' in safer sex in the light of HIV/AIDS. *SAHARA J : journal of Social Aspects of HIV/AIDS Research Alliance / SAHARA , Human Sciences Research Council* 2009,6:33–41.

29.   Magnani RJ, Karim AM, Weiss LA, Bond KC, Lemba M, Morgan GT. Reproductive health risk and protective factors among youth in Lusaka, Zambia. *The Journal of adolescent health : official publication of the Society for Adolescent Medicine* 2002,30:76–86.

30.   Tapia-Aguirre V, Arillo-Santillán E, Allen B, Angeles-Llerenas A, Cruz-Valdéz A, Lazcano-Ponce E. Associations among condom use, sexual behavior, and knowledge about HIV/AIDS. A study of 13,293 public school students. *Arch Med Res* 2004,35:334–343.

31.   Maswanya ES, Moji K, Horiguchi I, Nagata K, Aoyagi K, Honda S*, et al.* Knowledge, risk perception of AIDS and reported sexual behaviour among students in secondary schools and colleges in Tanzania. *Health education research* 1999,14:185–196.

32.   Agot KE, Kiarie JN, Nguyen HQ, Odhiambo JO, Onyango TM, Weiss NS. Male circumcision in Siaya and Bondo Districts, Kenya: prospective cohort study to assess behavioral disinhibition following circumcision. *Journal of acquired immune deficiency syndromes* 2007,44:66–70.

CHAPTER 3

An Intervention Study Examining the Effects of Condom-Wrapper Graphics

and Scent on Condom Use in the Botswana Defence Force

Abstract

Background: HIV prevention peer educators in the Botswana Defence Force (BDF) report that government-issued condoms are often not used due to an unpleasant scent and unattractive wrapper. Formative work among BDF personnel found that scented condoms were highly preferred and condoms packaged in a camouflage wrapper were appealing. It was suggested that providing such condoms would increase usage. A non-randomized intervention study is implemented to examine the effects of scent and wrapper graphics on increasing condom use in the BDF.

Methods and Findings: From October 2010–April 2011, 211 sexually-active male BDF soldiers, aged 18–30, participated in the study. Participants at four bases received condoms in a plain blue or camouflage wrapper, either scented or unscented. Sexual activity and condom use were measured pre- and post-intervention with a diary over two weeks each. A condom use rate (CUR, frequency of protected sex divided by total frequency of sex) was computed for each participant. Mean CURs significantly increased by 8.8% (85.7% baseline vs. 94.5% post-intervention, $p < 0.001$). A significant wrapper by time interaction demonstrated a differential increase in CURs between the wrapper groups; adjusted odds of condom use from baseline to post-intervention was higher for those receiving camouflage wrappers compared to blue wrappers (OR = 2.33, 95% CI = 1.05–5.16). Adjusted odds of condom use was also higher for those reporting using scented versus unscented condoms (OR = 1.96, 95% CI = 1.18–3.24).

Conclusions: Results demonstrate that both scented condoms and condoms packaged in a camouflage wrapper increased CURs in the BDF. Providing these condoms,

coupled with messages of correct and consistent condom use, could help reduce HIV infection among military personnel.

Introduction

Botswana has one of the highest HIV prevalence in the world, with an estimate of 24.8% among adults aged 15–49 [1]. Although the general population is at risk for HIV, there is concern that military personnel may be particularly vulnerable due to unique circumstances that surround military service, including high mobility and frequent deployments [2, 3]. Studies have also found high HIV risk-taking behaviors among military personnel, including having multiple sexual partners [4, 5] and alcohol abuse [6, 7].

Although studies demonstrate that correct and consistent condom use is highly effective against HIV [8–10], studies also show that consistent condom use among military personnel is relatively low [4–7]. For example, a study in the Nigerian military showed that consistent condom use was only found in 16–20% of participants [7], and among those who ever had sex with a sex worker, 41% did not use a condom the last time they had sex with that partner type [5]. As part of the prevention efforts of the Botswana Defence Force (BDF) to reduce HIV infection in their forces, free condoms are available to military personnel at the bases through condom dispensers, clinics, and hospitals. However, anecdotal evidence suggests that the government-issued condoms are often not used to due to an unpleasant scent and unappealing wrapper. To prevent HIV in the BDF, having a government-issued condom that is well accepted and available for personnel to use is very important. Accessing stores to purchase condoms may be difficult, especially for those on deployments or stationed

at remote sites. Additionally, although military personnel have the option to buy and use condoms of their liking, they may not make time to purchase condoms.

Some African militaries recently received a scented (e.g., orange, vanilla) condom packaged in a camouflage wrapper, which was well liked by their personnel. In formative work for this study, the same condom was presented to a group of male BDF soldiers, who also voiced similar satisfaction with the appearance of the wrapper and the scent of the condom. It was suggested that providing condoms with these particular characteristics may help increase usage. To the best of our knowledge, there are no published studies examining the effect of a condom's scent, nor the wrapper appearance, in increasing condom use among military personnel. Addressing these questions are important, as the study results could be used by the BDF to better allocate their financial resources regarding what type of condom to distribute. In addition, as funding for HIV prevention activities require justification, it is useful to provide evidence-based data that would support the distribution of these particular condoms.

This paper presents findings from a non-randomized intervention that examined the effects of condom-wrapper graphics and scent in increasing condom use among BDF military. The following hypotheses were tested: (1) condom use will increase after introducing the intervention condom, (2) condom use will be higher among those receiving the intervention condoms packaged in a camouflage wrapper compared to those receiving the condoms in a blue wrapper, and (3) condom use will be higher among those who reported using scented condoms.

Methods

Study Design and Site Selection

From October 2010–April 2011, a non-randomized intervention study was implemented in the BDF. Due to limited resources and logistical feasibility, only four BDF sites were selected for participation: two in the south (S1, S2) and two in the north (N1, N2). These sites were selected based on the availability of a large number of military personnel, and similarity in terms of total size, proportion of military units, and urban/rural locale, which has been shown to be an important HIV risk factor [11, 12].

Study Participants

For inclusion in the study, participants had to be sexually-active male BDF military personnel, aged 18–30 years, and stationed at the four selected military sites. Age eligibility was capped at 30 because those older than 30 may be more likely to be married and less likely to use condoms. Studies report lower condom use with increasing age and among those who are married [13, 14]. Participant recruitment was accomplished one month prior to the designated study start date with the use of flyers, command newsletters, and regular military communication channels. Interested military personnel attended an informational briefing where the study purpose and objectives were explained. Prior to consenting to participate, individuals were given an opportunity to ask questions. A total of 211 men (81.2%) agreed to participate and provided written informed consent. Institutional review boards in the United States (Naval Health Research Center and San Diego State University, San Diego, California) and Botswana (Ministry of Health, Gaborone, Botswana) approved the

study prior to data collection. Individuals were not provided any monetary compensation for their participation. Light refreshments were provided during the study visits. Participants received a small supply of condoms (~20) at the end of the study.

Sample Size

The target sample size was 260 participants ($n = 65$ from each of the four selected BDF sites). It was based on detecting a 10% difference (at $\alpha = 0.05$ level of significance and 80% power) in condom use rates between participants who received a condom packaged in a camouflage wrapper and those who received the same condom packaged in a plain blue wrapper. Correction factors of 1.4 to account for the heterogeneity between subjects and 1.15 to account for the potential loss of participants over time were included in the sample size calculation.

Baseline and Intervention Condoms

Baseline condoms consisted of government-issued condoms (Lorato or Carex brands) or other condom brands used by participants. The intervention condom was selected by the BDF, as they perceived it to be of a "higher quality" than the government-issued condoms. Condoms were packaged in a plain blue wrapper, or a wrapper with a camouflage pattern unique to the BDF (see Figure 3.1), and available as scented (e.g., vanilla, tutti fruitti) or unscented. BDF sites S1 and S2 received condoms packaged in the plain blue wrapper; the word "Condom" was printed on one side and "Protect Yourself" printed on the other. BDF sites N1 and N2 received the same condom as S1 and S2, except the condoms were packaged in the camouflage wrapper. "Protect Yourself" was printed on one side and "Sekwata, go ya go ileng"

was printed on the other side. Sekwata stands for "Sex Education Knowledge with AIDS Testing Awareness" and the phrase "go ya go ileng" translates to "until the end of time". These messages are commonly used in the BDF HIV prevention programs. With regards to the condom scent, sites S1 and N1 received the unscented version, and S2 and N2 received the scented version. Randomization was not used to allocate the wrapper, nor the scent, due to the small number of sites included in the study.

Study Procedures

Figure 3.2 summarizes the flow of participants. Study personnel briefed interested individuals on the study purpose and conducted the written informed consent process. Consented participants provided their contact information, so they could be contacted for further visits, and completed a paper-based survey that collected demographics, military background, and HIV risk behaviors. The survey was administered in a group setting where questions were read out loud by a trained survey administrator while participants followed along and marked responses on their surveys. The baseline survey was adapted from a previous survey administered to the BDF.

After the baseline survey, participants attended a training session on how to complete a weekly sexual behavior diary. The diary was pre-tested among a group of BDF soldiers that did not participate in the study prior to being finalized. The diary was a bound booklet that provided a template to record up to three sexual occasions that occurred during one day. Participants were asked to complete the dairy on a daily basis and to provide the type of partner that participated in each sexual occasion, whether a condom was used or not during each encounter, and the reasons why. The

diary also allowed participants to specify that they did not have sex that particular day. Detailed instructions on how to properly complete the diary were explained during the training session and included in the diary, along with an example of how to complete the diary based on fictional data. Four diaries were distributed during the study: two (Diary 1, Diary 2) were used to measure baseline behaviors, and two (Diary 3, Diary 4) were used to measure post-intervention behaviors. Diary 1 was distributed at the end of the training session.

At the first follow-up visit, participants returned Diary 1 and received Diary 2. One week later, at the second follow-up visit, participants returned Diary 2. At that time, an ample supply of intervention condoms according to site assignment were distributed to the participants and made available at the base level. The intervention period lasted for one month. During the intervention period, condom consumption was closely monitored at each of the study sites. Study personnel ensured that an adequate supply was always available through the regular distribution mechanisms (i.e., condom dispensers or BDF clinics/hospitals) and participants were informed they could contact study personnel if they needed more condoms. Two weeks into the intervention period, at the third follow-up visit, participants were contacted to attend a refresher training session on how to complete the sexual behavior diary. Diary 3 and more condoms were distributed. One week later, at the fourth follow-up visit, participants returned Diary 3 and received another supply of condoms and Diary 4. At the final follow-up visit, participants returned Diary 4 and were asked to complete a follow-up survey, which queried them about their sexual behaviors reported in Diaries 3 and 4. In addition, several randomly selected participants were invited to attend a

focus group session, which included discussions of condoms, usage, and reporting sexual behaviors using the paper surveys and diaries.

Due to circumstances beyond our control (e.g., military trainings, call to duty), 31 and 33 participants from sites S2 and N1, respectively, were unable to complete Diaries 3 and 4 on the scheduled timeline. These participants completed the diaries about four months (instead of two weeks) after the intervention started. A bias analysis comparing demographics, military background, sexual behaviors, and condom use, access, and attitudes was performed between those who followed the scheduled timeline and those who did not, as these variables may have biased the completion of the diaries. Participants who completed the diaries four months later were more likely to be from the Fighting unit. Differences in sexual behaviors and condom use, access, and attitudes were also examined by military unit, yielding no significant differences. Therefore, we concluded the deviation from the protocol was unrelated to the data collection methods; rather it was a result of military duties. The BDF typically sends soldiers from the Fighting unit for trainings and emergencies, which may last two months or more.

A total of 10 participants withdrew from the study. A bias analysis comparing demographics and military background of withdrawn participants to those who remained showed no significant differences. Similar analyses were performed for 17 who were lost to follow-up. Those who were lost to follow-up were more likely to be from the Fighting, Support, or Trainers unit.

Outcome Measures

A condom use rate (CUR) was computed for each participant and defined as the frequency of protected sex (i.e., use of a condom) divided by the total frequency of sex over all partner types in the course of two weeks. CURs at baseline were computed using data from the first two diaries and rates post-intervention were computed using data from the last two diaries. For ease of interpretation, CURs were expressed as percentages and ranged from 0–100%.

Statistical Analysis

Comparisons of baseline demographic characteristics and HIV risk behaviors by the two wrapper groups were conducted using Fisher's exact tests for categorical variables and Wilcoxon two sample t-tests for continuous variables.

Analyses were performed using the intent-to-treat principle. Figure 3.3 shows the flow of participants used for analysis. Participants were excluded if they did not complete the diaries or did not report sexual activity. Due to the longitudinal nature of the study, not all participants had two weeks each of baseline and post-intervention measurements. For example, a participant may have completed the first, third, and fourth diaries but was missing the second diary. Therefore, this participant had baseline behaviors measured for one week and post-intervention behaviors measured for two weeks. Analysis was conducted for 155 participants with baseline and post-intervention measurements of varying follow-up time (i.e., 1 or two weeks), and among 135 participants who had two weeks each of baseline and post-intervention measurements.

To evaluate the overall intervention effect on CURs over time, the Wilcoxon signed-rank test for paired data was used, where each individual acted as their own

control. To examine the effect of the wrapper on CURs, several analyses were conducted. First, we compared the change in CUR from baseline to post-intervention between the two wrapper groups, using the Wilcoxon rank-sum test. Second, we analyzed the CUR at the two time points and for the two groups using mixed-effects logistic regression (MELR). In this analysis, the CUR at each time point and for each subject is assumed to follow a binomial rate distribution, with the total number of sex acts over the time period of interest, n, as the denominator. This total number n acts in effect as a weight in the logistic regression model. The log-odds of condom use for each sex act are a function of the time point, condom wrapper group, and other variables. The correlation between outcomes for the same subject at the two time points is modeled by a subject-specific random effect (random intercept). Since the baseline CUR is not related to the intervention (type of condom wrapper), the overall effect of the intervention is given in this model by the time effect (post-intervention versus baseline). Moreover, the differential effect of the two wrapper types on CURs translates into an interaction effect between the wrapper type (group) and time, i.e., different slopes for the two groups. Four MELR models were considered: (1) Model 1 included a time effect only, to evaluate the overall intervention effect. This model is comparable to the two-group Wilcoxon rank-sum test analysis described above; (2) Model 2 included time, wrapper type, and their interaction, to evaluate the effect of the wrapper; (3) Model 3 expanded on Model 2, and included reports of using scented condoms, to evaluate the effect of the condom scent, and adjustment for characteristics that differed by the two wrapper groups (marital status, education, military unit, the different brands of condoms used at baseline – Other brands vs. Lorato/Carex, and the

type of sexual partners that were indicated in the diaries – casual/regular or casual partners vs. regular partner only). Although we tried to assign which sites received unscented and scented condoms, we realized that participants had access to both scented and unscented condoms from other sources throughout the study. Therefore condom scent was treated as a time-varying independent variable; (4) Model 4 expanded on Model 3 by also including interaction terms between marital status and time, and education and time. We were interested in evaluating these characteristics as possible factors explaining the intervention effect, as literature have shown both to be associated with condom use [13, 14]. If these interaction terms were not statistically significant, they were removed from the model.

Analyses were two-tailed ($\alpha = 0.05$ was used to determine the statistical significance of independent variables and interaction terms) and performed using SAS statistical software version 9.3 (SAS Institute, Cary, NC).

Results

Comparisons of baseline characteristics between the two wrapper groups are presented in Table 3.1. In general, the two wrapper groups were similar in most baseline characteristics. However, participants assigned the blue wrapper were more likely to be single (89.2% vs. 72.5%, $p = 0.002$), more likely to have completed tertiary/vocational school (34.2% vs. 13.2%, $p < 0.001$), and more likely to have been from the Support Unit (37.0% vs. 17.6%, $p < 0.001$) in comparison to those assigned the camouflage wrapper. Frequency of condom use, number of lifetime and regular partners, alcohol use, and HIV knowledge score were similar between the two groups.

The median number of casual partners was slightly higher among participants assigned the blue wrapper than the camouflage wrapper (3 partners vs. 2 partners, $p = 0.033$).

Table 3.2 shows mean CURs, at baseline and post-intervention, for the overall study population and stratified by wrapper type. The mean CUR of the study population was 85.7% at baseline and increased to 94.5% post-intervention; the mean increase of 8.8% was statistically significant ($Z = -4.2$, $p < 0.001$). When stratifying by wrapper type, the mean baseline CUR was slightly higher for participants receiving the blue wrapper (mean = 88.2, SD = 23.2) vs. the camouflage wrapper (mean = 82.6, SD = 30.0), but this difference was not statistically significant ($p = 0.27$). The mean post-intervention CUR was also similar between the two groups (blue wrapper mean = 94.4, SD = 14.4 vs. camouflage wrapper mean = 94.7, SD = 16.8). The mean change in CUR (ΔCUR) between the wrapper types over time was higher in the camouflage wrapper group (mean ΔCUR = 12.1, SD = 29.0) vs. the blue wrapper (mean ΔCUR = 6.2, SD = 24.2). The observed difference between the groups was not statistically significant, but it showed a statistical trend ($p = 0.057$).

As shown in Figure 3.4, CURs increased over time among the overall study sample. Increasing rates were confirmed in the MELR models (Table 3.3). As observed in Model 1, the odds of condom use was nearly 4 times higher post-intervention when compared to baseline (OR = 3.48, 95% CI = 2.46–4.92). In Model 2, the wrapper by time interaction was highly significant ($p = 0.002$), providing evidence of a differential increase in CURs between the two wrapper groups, as shown in Figure 3.5. The odds of condom use post-intervention compared to baseline were

almost 7 times higher among participants receiving camouflage wrappers ($OR_{Camouflage}$ = 6.65, 95% CI = 3.79–11.65), but this odds ratio was only about 2 times higher among those receiving blue wrappers (OR_{Blue} = 2.13, 95% CI = 1.35–3.36). Thus, we find the odds ratio is over 3 times higher for the camouflage wrapper group compared to the blue wrapper group ($OR_{Camouflage}$ / OR_{Blue} = 3.12, 95% CI = 1.51–6.43). The interaction of wrapper and time remained significant, even after adjustment for the effect of the condom scent and other covariates (Table 3.3, Model 3), and in the presence of the education and time interaction (Table 3.3, Model 4); however, the observed assocations were attenuated.

Condom scent was also found to be significantly associated with the odds of condom use, as presented in Table 3.3. A crude model that only included time and condom scent yielded similar associations (data not shown). As observed in Model 3, after adjustment for the wrapper effect and other covariates, the odds of condom use were over 2 times higher among participants who reported using scented condoms as opposed to those who reported using unscented condoms (OR = 2.28, 95% CI = 1.40–3.71). This association remained significant in the presence of the education and time interaction term (Model 4).

When evaluating whether marital status or education could explain the intervention effect, we found that only education had a substantial influence (Table 3.3, Model 4). The interacton of marital status and time (p = 0.20) was not statistically significant and therefore dropped from Model 4. Although CURs increased over time for both education groups, the change was substantially steeper for participants who were lowered educated (see Figure 3.6). The odds of condom use was almost 5 times

higher post-intervention, compared to baseline, for participants who were lower educated, i.e., completed only junior/secondary school ($OR_{Lower\ Educated}$ = 4.59, 95% CI = 2.95–7.15). In contrast, condom use by time did not differ significantly for those who were higher educated, i.e., completed tertiary or vocational school ($OR_{Higher\ Educated}$ = 1.76, 95% CI = 0.85–3.62). When comparing the odds ratio beween the two education groups, the odds ratio is almost 3 times higher among participants who were lower educated ($OR_{Lower\ Educated}$ / $OR_{Higher\ Educated}$ = 2.61, 95% CI = 1.10–6.19).

Similar results were observed for all analyses when data were restricted to the 135 participants who had two weeks each of baseline and post-intervention measurements (data not shown).

Discussion

An intervention study was implemented in the Botswana Defence Force (BDF) to increase condom use among their forces. Results demonstrate that condom use rates (CUR) increased after introducing the intervention condom (85.7% baseline vs. 94.5% post-intervention); the mean increase of 8.8% between the two time points was statistically significant. These observations were confirmed in the mixed-effects logistic regression model evaluating the effect of time. The success of the intervention is likely due to formative work on condom use conducted by the BDF and Population Services International, and the fact that investigators listened to the needs and desires of the target population. The condom selected for this study was well received and highly preferred by BDF military personnel. These results support other studies that have discussed the beneficial uses of social marketing techniques, especially in the area of condom social marketing [15–18]. The increase in CURs over time could also

be due to the distribution of condoms to participants, which may have helped promote condom awareness and use. The success of condom distribution campaigns have been reported in other studies [15, 19]. However, these findings should be interpreted with caution. The observed increase in condom use over time may not be fully attributable to the intervention, as a control group (i.e., participants who did not receive an intervention) was not included. A control group was not included because we found it unethical to withhold the intervention condoms from participants, as the main purpose of this study was to increase condom use in military personnel, and we strongly believed the intervention would have a beneficial effect.

To evaluate the effect of the wrapper, the mean change in CURs were compared between the two groups, and the interaction of wrapper with time was examined. The mean difference was marginally significantly higher among the camouflage wrapper group compared to the blue wrapper group ($p = 0.057$). Additionally, the interaction between wrapper and time was found to be highly statistically significant ($p = 0.022$), indicating the change in CURs over time differed by the wrapper type. As observed in Figure 3.5, although CURs increased over time for both groups, the change was substantially steeper for those who received camouflage wrappers than blue wrappers. These results suggest that condom-wrapper graphics may influence whether a condom is used or not. The camouflage wrappers may have a bigger impact because the design is linked to the military environment and is exclusive to that profession. Additionally, the camouflage pattern may remind military personnel that their duty as soldiers is to maintain their health and protect against HIV by consistently using condoms. Distributing condoms packaged in a

camouflage pattern unique to each military may help reinforce these beliefs and bring these messages closer to home. Similar positive themes regarding the impact of the camouflage wrapper design were brought up by participants during the focus group sessions. However, some also expressed concern with using the BDF "Sekwata" campaign slogan, which may lead others to think that soldiers were being more promiscuous if the wrappers were carelessly disposed of. Follow-up research regarding these concerns should be explored.

Results show a significant association between condom scent and use, with CURs higher among participants who reported using scented condoms. These data support anecdotal evidence that scent is an important element that some BDF soldiers look for in a condom because it makes sex smell pleasant. In the focus group sessions, soldiers also mentioned they would use condoms more often if they were scented and that most of their sexual partners also preferred scented condoms. However, some also indicated they would still use unscented condoms if the scented ones were not available. Therefore, the BDF should strongly consider supplying both types of condoms to their military personnel to increase use and maintain consistency.

Interestingly, CURs also increased at a significantly steeper slope over time among participants who were lower educated than those who were more educated, suggesting the intervention had a larger influence on condom use among lower educated participants. However, as with any multi-dimensional intervention, it may be difficult to "tease out" which aspects of the intervention had the most impact. These observations may be explained by the wrapper design. The condom-wrapper graphics may not have had as much of an impact on educated participants, as they may already

be aware that condom use protects against HIV and were most likely using condoms more frequently, as shown in other studies [13, 20, 21]. However, those who were less educated may have been more influenced by the wrapper graphics. The camouflage wrapper pattern was unique to the BDF and may have instilled feelings of loyalty to the BDF and encouraged their use. Another possible explanation involves the method in which the data was collected. All participants were asked to record their sexual and condom use behaviors in a diary. Individuals who were less educated may have become more aware of their sexual and condom use behaviors simply by recording them, and as a result may have changed their behaviors over time. Other studies have reported the positive effects of self-monitoring one's behaviors, such as food intake [22–24], and subsequent behavior change. However, these associations should be interpreted with caution for several reasons. Those who were more educated were most likely already practicing safer sex, so neither monitoring these behaviors nor the condom-wrapper graphics may have had much impact. Additionally, baseline CURs were not the same for the two groups, and the potential for a large change in CURs was more limited for the higher educated group, which already started at a higher baseline rate.

The intervention was not randomized, which may help explain why several baseline characteristics differed between the wrapper groups. Randomization was not feasible due to the small number of BDF sites selected for this study. To account for baseline differences, adjustments were made in the statistical analyses. The original target sample size for some of the sites was not reached, leading to unbalanced numbers between the wrapper groups. This could possibly explain why baseline CURs

were slightly different between the two groups; however, this difference was not statistically significant. Due to strict participant eligibility criteria, study results may only be generalizable to BDF members of comparable age. Although not all BDF sites were included in the study, the four that were selected contained the largest number of BDF personnel of diverse backgrounds. As with any study that relies on self-reports, respondent bias may have been an issue. However, confidentiality measures were in place to ensure privacy during the survey administration and no personal identifiers were collected from the diaries. In addition, focus group discussions indicated that most participants felt comfortable and were honest in reporting their behaviors in both data collection modalities. Due to the high mobility of military personnel, in general, most participants were only followed for one month after the intervention was introduced. Even though a significant increase in CURs was observed over time, a study with longer follow-up time is needed to examine the long-term effects of the intervention. In addition, participants were only asked to maintain a diary for two weeks at a time, which may not have been long enough to capture "average" sexual and condom use behaviors. Due to circumstances beyond our control, a small group of participants were not able to complete the study on the scheduled protocol timeline. Although sexual or condom use behaviors did not differ between those who followed the timeline and those who did not, there may have been differences in unmeasured variables. Despite these limitations, there were also many strengths to this study including an overall high participation rate, a short follow-up time, which may have increased retention rates, and the intervention was innovative and novel.

In the absence of a cure, and lack of an effective vaccine for HIV/AIDS, the promotion of correct and consistent condom use is vital for preventing and reducing the number of HIV infections. To our knowledge, this is one of the first papers to examine the effects of condom-wrapper graphics and scent in increasing condom use among military personnel. Study results demonstrate that providing condoms packaged in a camouflage wrapper increased overall condom use in the BDF. Condom scent was also identified as a positive predictor of condom use. The BDF should strongly consider providing condoms with these particular characteristics to their members, coupled with messages of correct and consistent condom use with all types of sexual partners. As the results of this study may be unique to the BDF, further studies in other militaries should be conducted to better understand condom use logistics and to tailor HIV prevention programs. As the HIV epidemic continues to grow, other innovative ways of increasing condom use among military personnel should be explored to keep HIV prevalence low in this high risk population.

Table 3.1 Comparisons of baseline characteristics by wrapper type

| | Wrapper type (N = 211) | | | | |
| | Blue wrapper (n = 120) | | Camouflage wrapper (n = 91) | | *p*-value |
Variable	n	(%)	n	(%)	
Age in years, Mean (SD)	24.9	(2.3)	25.5	(2.4)	0.10
Marital status					0.002
Single, never married	107	(89.2)	66	(72.5)	
Married/cohabitating	13	(10.8)	25	(27.5)	
Education					<0.001
Junior/senior secondary	79	(65.8)	79	(86.8)	
Tertiary/vocational	41	(34.2)	12	(13.2)	
Religion					0.56
Christian	96	(80.0)	78	(85.7)	
Traditional	7	(5.8)	3	(3.3)	
African Traditional	4	(3.3)	3	(3.3)	
No religious affiliation	13	(10.8)	6	(6.6)	
Other non-Christian	0	(0)	1	(1.1)	
Military rank					0.30
Private	67	(55.8)	41	(45.1)	
Junior NCO[a]	47	(39.2)	45	(49.5)	
Warrant Officer/Senior NCO[a]	0	(0)	0	(0)	
Junior Officer	6	(5.0)	5	(5.5)	
Military unit[b]					<0.001
Air Arm	0	(0)	0	(0)	
Fighting	29	(24.4)	47	(51.7)	
Logistics	45	(37.8)	28	(30.8)	
Support	44	(37.0)	16	(17.6)	
Cadets	0	(0)	0	(0)	
Trainers	1	(0.8)	0	(0)	
Years in military, Median (Range)	3.0	(1–9)	4.0	(1–13)	0.074

Table 3.1 Comparisons of baseline characteristics, Continued

	Wrapper type				
	Blue wrapper (n = 120)		Camouflage wrapper (n = 91)		p-value
Variable	n	(%)	n	(%)	
Frequency of condom use					0.49
Always	62	(52.5)	43	(49.4)	
Most times	37	(31.4)	35	(40.2)	
Occasionally/never	19	(16.1)	9	(10.4)	
No. lifetime partners, Median (Range)	11.0	(2–200)	10.0	(1–200)	0.16
No. regular partners[c], Median (Range)	2.0	(0–25)	3.0	(0–35)	0.83
No. casual partners[c], Median (Range)	3.0	(0–45)	2.0	(1–115)	0.033
Alcohol use					0.15
Non/mild drinker (AUDIT < 8)	43	(36.4)	42	(47.2)	
Problem drinker (AUDIT $\geq$ 8)	75	(63.6)	47	(52.8)	
HIV knowledge score, Median (Range)	87.5	(50–100)	87.5	(37.5–100)	0.57

[a]Non-commissioned officer

[b]Excludes one participant with a missing response

[c]Reported number of partners in the 12 months preceding the survey

Table 3.2 Mean condom use rates at baseline and post-intervention in the overall study population and stratified by wrapper type

Condom Use Rate[a]	Total (N = 155)			Blue Wrapper (n = 87)		Camouflage Wrapper (n = 68)		
	Mean (SD)	Median (Range)	p-value	Mean (SD)	Median (Range)	Mean (SD)	Median (Range)	p-value
Baseline	85.7 (26.4)	100 (0–100)	–	88.2 (23.2)	100 (0–100)	82.6 (30.0)	100 (0–100)	0.27[d]
Post-intervention	94.5 (15.5)	100 (6.3–100)	–	94.4 (14.4)	100 (28.6–100)	94.7 (16.8)	100 (6.3–100)	–
Difference[b]	8.8 (26.5)	0 (-77.8–100)	<0.001[c]	6.2 (24.2)	0 (-71.4–100)	12.1 (29.0)	0 (-77.8–100)	0.057[e]

[a]Percent use rate among those who reported having sex

[b]Difference = post-intervention condom use rates – baseline condom use rates. For the total population, this is the mean paired difference. For the wrapper type, it is the mean difference within each group

[c]Results of Wilcoxon signed-rank test (z = -4.204)

[d]Results of Wilcoxon two sample t-test (z = -1.117)

[e]Results of Wilcoxon two sample t-test (z = 1.921)

Table 3.3 Mixed-effects logistic regressions modeling the odds of condom use by time, wrapper, scent, and other covariates

	Odds Ratio of Using a Condom (N = 155)							
	Model 1		Model 2		Model 3		Model 4[b]	
	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value	OR (95% CI)	p-value
Post vs. baseline	3.48 (2.46–4.92)	<0.001						
Cami wrapper Post vs. baseline			6.65 (3.79–11.65)	<0.001	6.41 (3.62–11.34)	<0.001	4.33 (2.24–8.41)	<0.001
Blue wrapper Post vs. baseline			2.13 (1.35–3.36)	0.001	1.98 (1.25–3.13)	0.004	1.86 (1.16–2.98)	0.010
Wrapper x time			3.12 (1.51–6.43)	0.002	3.24[a] (1.56–6.76)	0.002	2.33 (1.05–5.16)	0.038
Scented vs. unscented condom					2.28 (1.40–3.71)	0.001	1.96 (1.18–3.24)	0.009
Single vs. married/ cohabitating					2.84 (1.16–6.96)	0.022	2.88 (1.18–7.02)	0.020
Lower vs. higher educated					1.07 (0.45–2.58)	0.87		
Lower educated Post vs. baseline							4.59 (2.95–7.15)	<0.001
Higher educated Post vs. baseline							1.76 (0.85–3.62)	0.12
Education x time							2.61[c] (1.10–6.19)	0.030
Fighting vs. other units					1.09 (0.49–2.43)	0.83	1.08 (0.49–2.40)	0.85
Regular vs. any casual partners					1.36 (0.63–2.97)	0.43	1.36 (0.63–2.95)	0.43
Lorato/Carex vs. other brands					2.00 (0.79–5.07)	0.14	1.83 (0.73–4.62)	0.20

[a]This odds ratio refers to the ratio of the odds ratios between the two wrapper groups (Camouflage vs. Blue)

[b]The marital status by time interaction (p = 0.20) was not statistically significant at α = 0.05 and dropped from Model 4

[c]This odds ratio refers to the ratio of the odds ratios between the two education groups (Low vs. High)
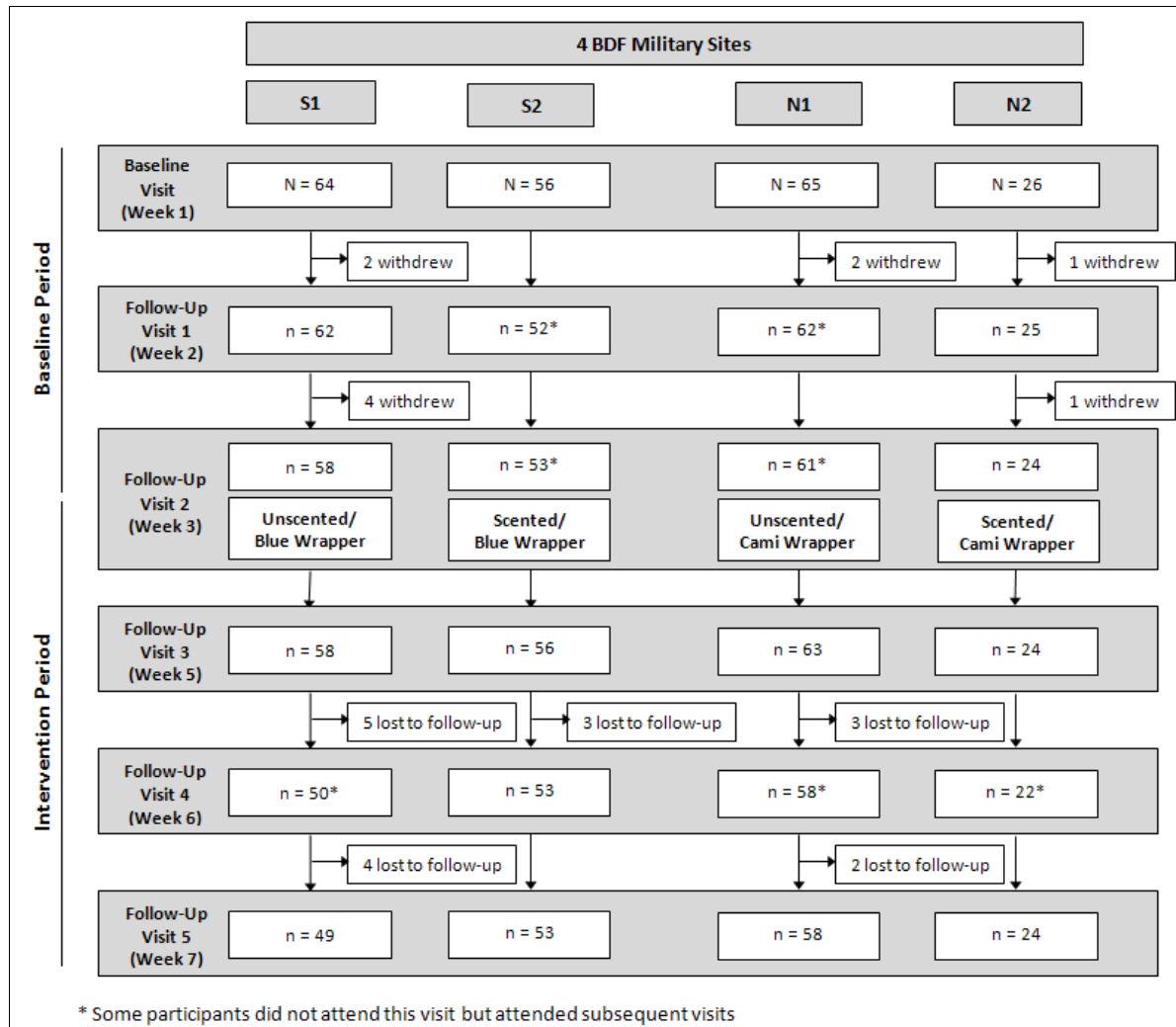
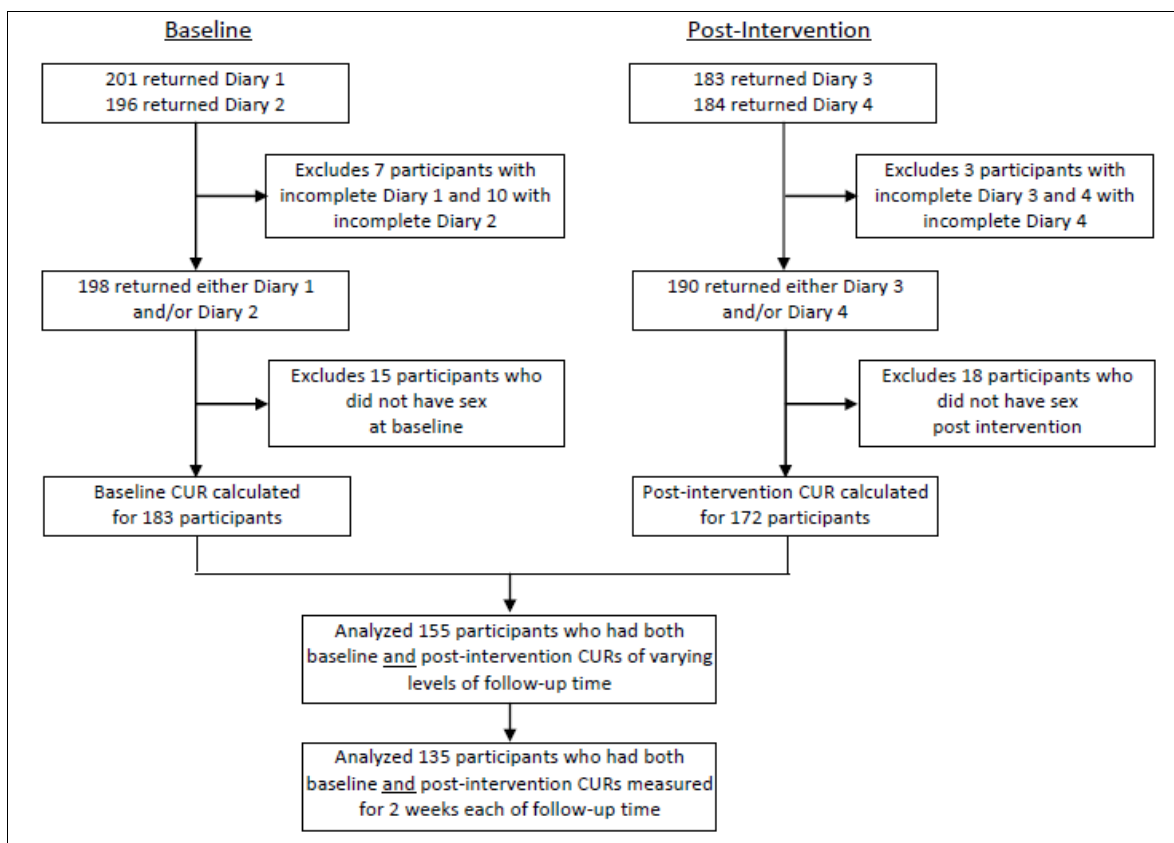Figure 3.1 Intervention condom wrapper designs

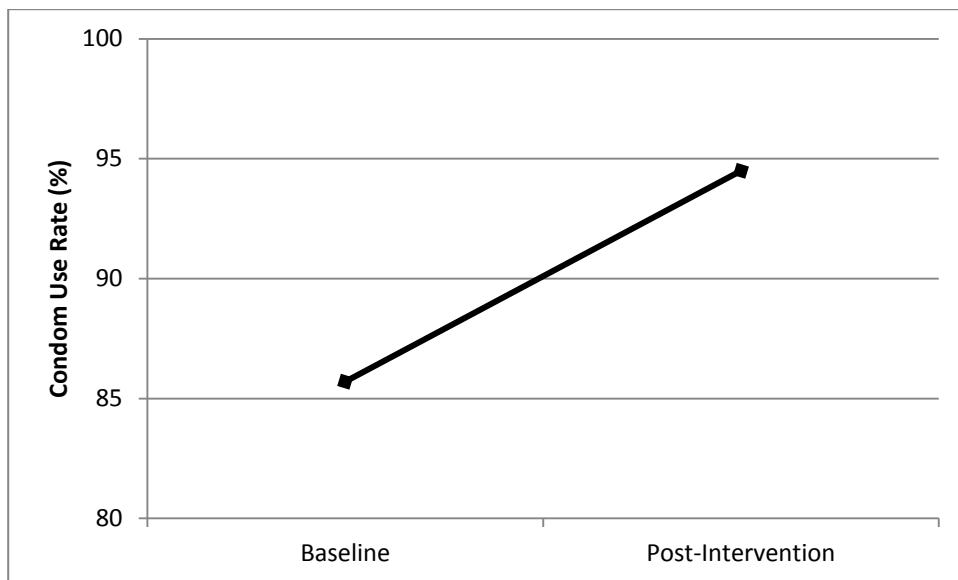Figure 3.2 Flow of participants

Figure 3.3 Flow of participants for data analysis

Figure 3.4 Mean condom use rates of the study population at baseline and post-intervention
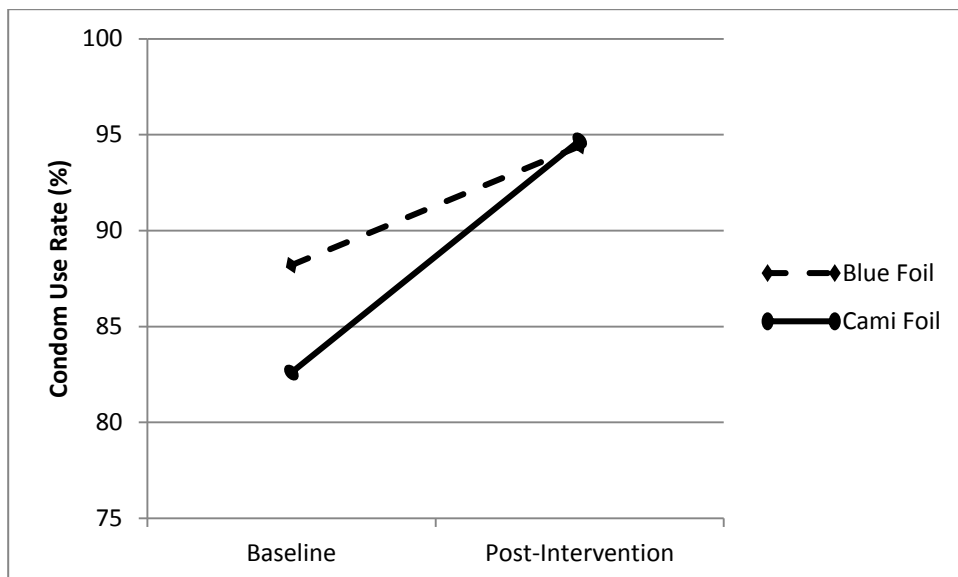
Figure 3.5 Mean condom use rates by wrapper type at baseline and post-intervention intervention
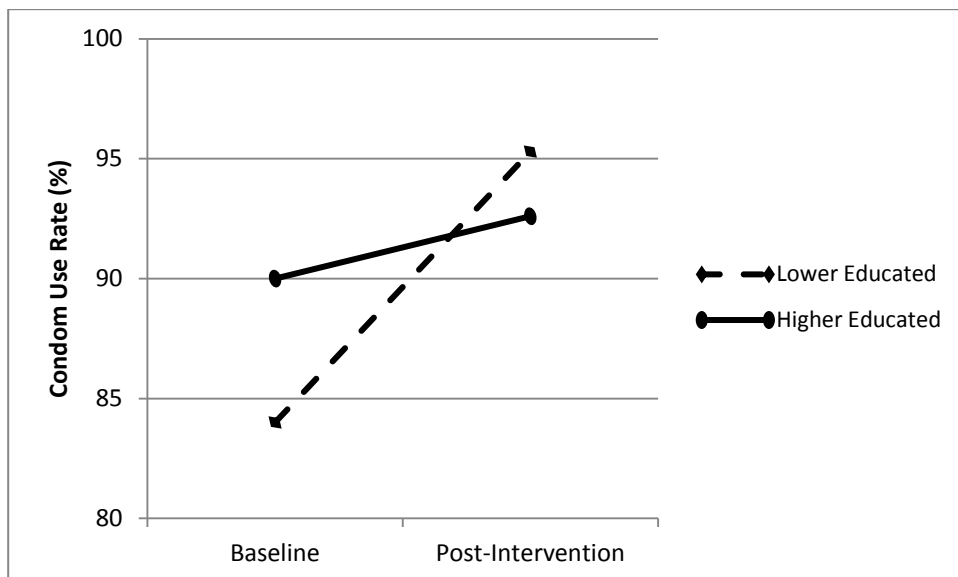
Figure 3.6 Mean condom use rates by education at baseline and post-intervention intervention

References

1. Joint United Nations Programme on HIV/AIDS (UNAIDS) & World Health Organization (WHO). AIDS Epidemic Update. In. Geneva: UNAIDS/09.36E/JC1700E; 2009.

2. Miller N, Yeager R. By virtue of their occupation, soldiers and sailors are at greater risk. Special report: the military. *AIDS Anal Afr* 1995,5:8–9.

3. Joint United Nations Programme on HIV/AIDS (UNAIDS). AIDS and the Military: UNAIDS Point of View. In. Geneva: UNAIDS; 1998.

4. Anastario M, Manzanero R, Blanco R, Reyes E, Jaramillo R, Black L*, et al.* HIV infection, sexual risk behaviour and condom use in the Belize defense force. *International journal of STD & AIDS* 2011,22:73–79.

5. Nwokoji UA, Ajuwon AJ. Knowledge of AIDS and HIV risk-related sexual behavior among Nigerian naval personnel. *BMC Public Health* 2004,4:24.

6. Bing EG, Ortiz DJ, Ovalle-Bahamon RE, Cheng KG, Huang FH, Ernesto F*, et al.* HIV/AIDS behavioral surveillance among Angolan military men. *AIDS Behav* 2008,12:578–584.

7. Okulate GT, Jones OB, Olorunda MB. Condom use and other HIV risk issues among Nigerian soldiers: challenges for identifying peer educators. *AIDS Care* 2008,20:911–916.

8. de Vincenzi I. A longitudinal study of human immunodeficiency virus transmission by heterosexual partners. European Study Group on Heterosexual Transmission of HIV. *The New England journal of medicine* 1994,331:341–346.

9. Pinkerton SD, Abramson PR. Effectiveness of condoms in preventing HIV transmission. *Social science & medicine* 1997,44:1303–1312.

10. Davis KR, Weller SC. The effectiveness of condoms in reducing heterosexual transmission of HIV. *Fam Plann Perspect* 1999,31:272–279.

11. Nationwide community-based serological survey of HIV-1 and other human retrovirus infections in a central African country. Rwandan HIV Seroprevalence Study Group. *Lancet* 1989,1:941–943.

12. Central Statistics Office & National AIDS Coordinating Agency. 2008 Botswana AIDS Impact Survey III. In. Gaborone: Central Statistics Office; 2009.

13. Kapiga SH, Lugalla JL. Male condom use in Tanzania: results from a national survey. *East Afr Med J* 2003,80:181–190.

14. Mnyika KS, Klepp KI, Kvale G, Ole-Kingori N. Determinants of high-risk sexual behaviour and condom use among adults in the Arusha region, Tanzania. *Int J STD AIDS* 1997,8:176–183.

15. Cohen DA, Farley TA, Bedimo-Etame JR, Scribner R, Ward W, Kendall C*, et al.* Implementation of condom social marketing in Louisiana, 1993 to 1996. *American journal of public health* 1999,89:204–208.

16. Van Rossem R, Meekers D. The reach and impact of social marketing and reproductive health communication campaigns in Zambia. *BMC Public Health* 2007,7:352.

17. Plautz A, Meekers D. Evaluation of the reach and impact of the 100% Jeune youth social marketing program in Cameroon: findings from three cross-sectional surveys. *Reproductive health* 2007,4:1.

18. Agha S, Karlyn A, Meekers D. The promotion of condom use in non-regular sexual partnerships in urban Mozambique. *Health policy and planning* 2001,16:144–151.

19. Burke RC, Wilson J, Kowalski A, Murrill C, Cutler B, Sweeney M*, et al.* NYC condom use and satisfaction and demand for alternative condom products in New York City sexually transmitted disease clinics. *Journal of urban health : bulletin of the New York Academy of Medicine* 2011,88:749–758.

20. Lagarde E, Carael M, Glynn JR, Kanhonou L, Abega SC, Kahindo M*, et al.* Educational level is associated with condom use within non-spousal partnerships in four cities of sub-Saharan Africa. *AIDS* 2001,15:1399–1408.

21. Westercamp N, Mattson CL, Madonia M, Moses S, Agot K, Ndinya-Achola JO*, et al.* Determinants of consistent condom use vary by partner type among young men in Kisumu, Kenya: a multi-level data analysis. *AIDS Behav* 2010,14:949–959.

22. Johnson F, Wardle J. The association between weight loss and engagement with a web-based food and exercise diary in a commercial weight loss programme: a retrospective analysis. *The international journal of behavioral nutrition and physical activity* 2011,8:83.

23.   Miller CK, Gutschall MD, Holloman C. Self-monitoring predicts change in fiber intake and weight loss in adults with diabetes following an intervention regarding the glycemic index. *Patient education and counseling* 2009,76:213–219.

24.   Mockus DS, Macera CA, Wingard DL, Peddecord M, Thomas RG, Wilfley DE. Dietary self-monitoring and its impact on weight loss in overweight children. *International journal of pediatric obesity : IJPO : an official journal of the International Association for the Study of Obesity* 2011,6:197–205.

CHAPTER 4

A Comparison of Reported Sexual and Condom Use Behaviors from a Retrospective

Survey versus a Prospective Diary in the Botswana Defence Force

Abstract

Background: Most studies examining self-reported sexual behaviors from a retrospective survey relative to a prospective diary have only been conducted in the general population, while this study focuses on 161 male military personnel in the Botswana Defence Force (BDF). Studies in military personnel are needed to better tailor data collection methods.

Methods and Findings: Findings are drawn from follow-up data collected from a condom-wrapper graphic intervention study conducted in the BDF from October 2010–April 2011. Participants completed two post-intervention weekly sexual behavior diaries and a retrospective survey which queried them about behaviors reported in the same time frame as the prospective diaries. Most sexual behaviors reported in the survey were similar to reports found in the diary. However, the level of agreement above chance was relatively low for reports of sex with a spouse and the exchange of material goods for sex with a casual partner. Under- and over- reporting of sex was also observed for spousal and regular non-cohabiting partners, respectively. Frequency of sex and condom use rates among those who had a spouse also differed between the modalities. In comparisons of reported condom use frequency from the survey to condom use rates from the diary, we found the level of agreement between the two diminished as we moved further away from the "always" using condoms category. There was also substantial variability observed in the interpretation of the retrospective categories.

Conclusions: These results suggest that retrospective surveys are useful for measuring recent sexual behaviors, although prospective diaries may be more reliable in

collecting routine and sensitive sexual practices in the BDF. Further research among military personnel is needed to better understand reporting behaviors in this population and examine other data collection methodologies that will improve reporting accuracy.

Introduction

Assessments of sexual behaviors (i.e., sexual activity and condom use) rely substantially on self-reports. Diaries are commonly used in many diverse settings to measure sexual behaviors [1–3]. They are typically considered the closest approximation to a "gold standard" [4, 5], as issues with retrospective biases are reduced, and accurate reports on sexual behaviors are obtained due to contemporaneous data collection [6–8]. However, maintaining a diary requires strong participant commitment [8], which could become tedious. Respondents may become more aware of their behaviors merely by regular reporting (reactivity) [9], which may lead to changes in sexual or reporting behaviors over time. Participants may also not be completing the diary according to the specified time (e.g., daily), possibly introducing retrospective bias.

An alternative to the diary is the more commonly used self-completed retrospective survey [10–12]. Advantages of the survey include low cost and the ability to administer it to large groups at once. In comparison to face-to-face interviews, participants may feel less threatened about reporting their sexual behaviors in a survey [13], which may result in more accurate data. However, the major drawback of the retrospective survey is the possibility of recall bias. Individuals differ in their ability to remember past events, and accurate reports of sexual behaviors may be influenced by the length of the recall [4], use of memory tools, as well as the frequency of the behavior being assessed [5, 6]. Other limitations include having

participants group their usual or "average" behaviors into one category, which may not reflect actual behaviors that are irregular or infrequent [14].

Studies examining the convergence of reported sexual behaviors from a retrospective survey relative to a prospective diary have found both under- [15, 16] and over-reporting [14, 17] of behaviors, with no obvious trend in direction [5]. Observed differences may be explained by the time frame in which the survey was administered following completion of the diary, and the frequency of the sexual behavior being assessed. Infrequent behaviors may be more easily remembered by participants [7] and recalled more accurately than frequent behaviors [17]. Recall error has been shown to increase with more frequent sexual behaviors [18]. Other reasons for discrepancies include the content of the data collection tools, variations in the interpretation of the content by participants [19], and the use of different study populations (e.g., female sex workers, college students, etc.).

To our knowledge, comparisons of diary and retrospective survey estimates of reported sexual behaviors among military personnel have not been previously explored. Results can be used to guide which data collection methodology is best for this study population. This paper compares reports of sexual activity and condom use behaviors from a retrospective survey, relative to a prospective diary, among Botswana Defense Force (BDF) military personnel.

Methods

Study Design and Participants

From October 2010–April 2011, a non-randomized intervention study was conducted to examine the effect of condom-wrapper graphics and scent on condom use in the BDF. The intervention consisted of the distribution of a condom (scented or unscented) packaged in a plain blue or military-inspired camouflage wrapper. The findings of this paper are drawn from follow-up data collected from the intervention study. Participants were sexually-active male BDF military personnel, aged 18–30 years, and stationed at four selected military sites.

Participant recruitment was accomplished through the use of flyers, command newsletters, and regular military communication channels. Interested personnel attended an informational briefing where the study purpose and objectives were explained. Prior to consenting to participate, individuals were given an opportunity to ask questions about their possible participation. A total of 211 men (81.2%), of a target sample size of 260, agreed to participate and provided written informed consent. Institutional review boards in the United States (Naval Health Research Center and San Diego State University, San Diego, California) and Botswana (Ministry of Health, Gaborone, Botswana) approved the study prior to data collection.

Study Procedures

BDF study personnel briefed interested individuals on the intervention study and conducted the written informed consent process. Consented participants provided their contact information, so they could be contacted for follow-up visits, and completed a baseline survey that collected demographics and HIV risk behaviors. After the baseline survey, participants attended a training session on how to complete

a weekly sexual behavior diary. Prior to study implementation, the diary was pre-tested among a group of BDF soldiers who did not participate in the study; comments and suggestions were incorporated. Each diary was a bound booklet that contained a unique study ID number, which was linked to the participant's contact information. No personal identifiers were collected in the diary. Detailed instructions on how to properly complete the diary were explained during the training session and included in the diary. Sexual behavior terminology, definitions for the different sexual partner types, and an example of how to complete the diary based on fictional data was also provided in the diary.

Four diaries were distributed during the study. Diaries 1 and 2 were used to measure baseline sexual behaviors, and Diaries 3 and 4 were used to measure post-intervention behaviors. Participants were contacted by study personnel to return each diary in person, after each week of completion. At the final study visit, participants returned Diary 4 *and* completed a retrospective survey, which queried them about their sexual activity and condom use behaviors as reported in the same time frame as Diaries 3 and 4. The survey was administered in a group setting, with participants sitting arm's length apart. Questions were read out loud by a trained survey administrator while participants followed along and marked their responses on their surveys. A calendar was provided to help participants anchor dates for the reporting period. Following the survey, several randomly selected participants were invited to attend a focus group session, which included discussions of reporting sexual behaviors in the survey and diary.

Of the 211 consented participants, 31 (14.7%) did not have a completed follow-up survey because they had withdrawn from the study ($n = 10$), were lost to follow-up ($n = 17$), or attended the final visit but left the survey completely empty ($n = 4$). A bias analysis comparing the demographics and military background of these participants to those who completed the follow-up survey was performed. Those who did not complete the follow-up survey were more likely to be from the support unit than the other military units. A comparison of sexual and condom use behaviors between the different military units was performed, yielding no significant differences. Analyses was based on 164 (77.7%) participants who completed Diaries 3, 4, and the survey. Of these, 3 were excluded because the survey was administered prior to the completion of the diaries. Analyses were performed on the remaining 161 participants.

Measures

Sexual behavior diary. Participants were instructed to complete the diary on a daily basis and to not modify their sexual behaviors while participating in the study. For each day of the one-week diary, participants provided the date and specified (yes or no) whether they had sex, defined as vaginal or anal. If participants did not have sex, they were done completing the diary for the day. Otherwise, they were asked about total frequency of sex. Participants could record up to three sexual occasions that occurred during one day. For each sexual occasion, participants indicated the type of sexual partner by checking a box for spouse, regular cohabitating, regular non-cohabitating, or casual. Condom use for each sexual occasion was measured as yes or no. For those reporting sex with a casual partner, they were asked to specify (yes or no) whether any material goods (e.g., gifts, money, etc.) were exchanged for sex.

Retrospective survey. Participants were instructed to answer the survey questions in reference to the same time period in which they completed Diaries 3 and 4. The survey included items about the number of days (from the previous two weeks) the participant engaged in sex, the types of sexual partners, and the frequency of sex and condom use for each partner type. For those who reported having sex with a casual partner, they were asked to specify if they had exchanged any materials goods for sex (yes or no). Participants were also asked to indicate how often (always, most times, occasionally, never) they used a condom during sex.

Statistical Analysis

A condom use rate (CUR) was computed for each type of sexual partner and defined as the frequency of protected sex (i.e., use of a condom) divided by the total frequency of sex, over two weeks. An overall CUR was calculated for each participant in a similar fashion, and defined as the sum of all protected sex, divided by the sum of all sex. For ease of interpretation, CURs were expressed as percentages and ranged from 0–100%. Thirty-two participants reported a higher frequency of protected sex than total frequency of sex in the survey. Most of these participants were young (mean age = 25.2 years old), educated, and single (90.6%). Based on this demographic profile, a CUR of 100% was assigned, as literature has shown CURs to be higher among men with these particular characteristics [20, 21]. Separate analyses were performed excluding these 32 participants.

Descriptive statistics were computed, including frequencies and percentages for categorical variables and means and standard deviations for continuous variables.

Cohen's kappa statistic (κ) for categorical variables and Pearson's correlation coefficient (r) for continuous variables were used to examine the level of agreement in reports of sexual behaviors between the survey and diary. Corresponding 95% confidence intervals were also presented. The agreement and interpretation of κ was based on a scale developed previously; $\kappa < 0$ = less than chance, 0.01–0.20 = slight, 0.21–0.40 = fair, 0.41–0.60 = moderate, 0.61–0.80 = substantial, 0.81–0.99 = almost perfect [22]. McNemar's test was used to examine the presence of over- or under-reporting of binary variables (e.g., reported sex with a spouse —yes vs. no— between the diary and survey) by testing the difference between two correlated proportions. For continuous variables, the mean and standard deviations were reported for the survey and diary. The difference between the two, calculated by subtracting a respondent's estimate in the survey from the corresponding count derived from the diary, was presented, along with 95% confidence intervals. If the mean difference was 0, the diary and survey estimates were the same. If the mean difference was negative, the survey estimate was higher; if the difference was positive, the diary count was higher. If 0 was contained within the 95% confidence interval of the mean difference, it was concluded there was no significant difference between the survey and diary. Analyses were two-tailed with $p < 0.05$ considered statistically significant and performed using SAS statistical software version 9.3 (SAS Institute, Cary, NC).

Results

Demographic characteristics are presented in Table 4.1. The mean age was 25.3 years (range = 21–30). Most participants were single, never married (82.6%), had

completed at least senior secondary school (equivalent to high school) (72.1%), and of Christian faith (82.6%). The majority were ranked Private (48.5%) or Junior Non-commissioned Officers (46.0%), and in the Fighting (34.8%) or Logistics unit (37.3%). The mean years of military service was 4.2 years.

The measure of agreement between the diary and survey on reported types of sexual partners and the exchange of material goods for sex with a casual partner is shown in Table 4.2. With regards to having sex with a spouse, although the modalities agree 93.2% of the time, they would be expected to have a similar level of agreement by chance alone (88.8%), suggesting a fair agreement ($\kappa = 0.39$). For reports of having sex with a regular cohabiting partner, 86.9% of the data corresponded, which is much higher than the expected level of agreement by chance alone (50.9%), suggesting substantial agreement ($\kappa = 0.73$). Similar substantial agreements were observed for reports of sex with a regular non-cohabitating partner ($\kappa = 0.66$) and a casual partner ($\kappa = 0.68$). Regarding the exchange of material goods for sex with a casual partner, only 67.8% of the data agreed, which is similar to the expected level of agreement by chance alone (61.9%), suggesting a slight agreement ($\kappa = 0.16$).

The presence of over- and under-reporting of these variables is also presented in Table 4.2. Participants significantly under-reported having sex with a spouse in the survey compared to the diary ($n = 6/161$ vs. $n = 13/161$, $p = 0.03$), and over-reported having sex with a regular non-cohabitating partner in the survey ($n = 105/161$ vs. $n = 93/161$, $p = 0.02$). Although not statistically significant, the exchange of material goods for sex with a casual partner was under-reported in the survey ($n = 11/56$ vs. $n = 17/56$, $p = 0.16$).

Comparisons of the total number of days, out of 2 weeks, that a participant engaged in sex, and total frequency of sex are presented in Table 4.3. The mean number of days participants reported having sex in the survey (mean = 4.5, SD = 2.7, range = 0–12) was similar to the diary (mean = 4.3, SD = 2.6, range = 0–13). The correlation coefficient (r = 0.66) suggested a moderate correlation. Similar estimates between the modalities were also observed for total frequency of sex (survey mean = 6.7, SD = 5.4, range = 0–34 vs. diary mean = 7.2, SD = 5.8, range = 0–39). The mean difference was not significant and a moderate correlation was observed (r = 0.49). When frequency of sex was stratified by partner, similar estimates between the modalities were observed for regular cohabitating, regular non-cohabitating, or casual partners; moderate correlations were found. However, estimates of frequency of sex with a spouse was slightly lower in the survey (mean = 2.3, SD = 1.5, range = 1–4), relative to the diary (mean = 4.3, SD = 2.1, range = 2–6). Although the mean difference was not significant, a weak correlation was observed (r = -0.05).

Table 4.3 also compares CURs between the survey and diary for those who reported having sex. Estimates in the survey (mean = 92.3, SD = 18.2, range = 0–100) were slightly lower than those in the diary (mean = 94.7, SD = 14.9, range = 6.3–100). However, the mean difference was not significant and the correlation coefficient (r = 0.42) suggested a moderate correlation. Similar trends in condom use estimates were observed for regular cohabitating, regular non-cohabitating, and casual partners; although the correlation was substantially lower for casual partners. Among the 3 participants who reported having a spouse in both modalities, CURs were slightly higher in the survey (mean = 83.3, SD = 28.9, range = 50–100) than the diary (mean =

81.1, SD = 20.1, range = 60–100). Analyses excluding the 32 participants who reported a higher frequency of protected sex than total frequency of sex yielded similar results (data not shown).

One-hundred-forty seven participants provided a response for condom use frequency in the survey and had a corresponding CUR calculated from the diary. About 80% of participants (n = 117) reported always using condoms in the survey, 15.7% (n = 23) used condom most times, and 4.8% (n = 7) used condoms occasionally. No participants reported never using condoms (data not shown). Figure 4.1 shows the plot of retrospective condom use categories against CURs from the diary. The most consistent responses observed between the modalities were found among those who reported always using condoms on the survey. CURs ranged from 91.7–100%. Among those who reported using condoms most times or occasionally, more variability in the range of condom use was found (range $_{most\ times}$ = 22.2–100% and range $_{occasionally}$ = 6.3–85.7%).

Discussion

Results show that most reports of sexual and condom use behaviors between the retrospective survey and prospective diary were similar, although notable differences were observed for some behaviors. For example, the level of agreement above chance between the modalities for reports of sex with a spouse was relatively low and participants tended to under-report this behavior in the survey. Estimates of total frequency of sex were also higher in the diary compared to the survey; however, condom use rates (CURs) were higher in the survey relative to the diary. Furthermore,

a significantly higher proportion of participants reported having sex with a regular non-cohabitating partner in the survey compared to the diary. These results suggest that recall error, in the form of over- and under-reporting, may be more prevalent with behaviors that occur more regularly or frequently. As shown in other studies, frequency of the sexual behavior may influence how accurately a participant will remember the act and report it [5, 6]. For example, Schroder *et al.* [5] suggested that high-frequency events were less salient, which may cause people to forget these events more easily. Inaccurate reporting may be more typical among those who have a spouse or regular partner, as the sexual behaviors practiced in these forms of relationships may be more routine, less salient, and more easily forgettable. These results, however, are based on a small number of participants and therefore should be interpreted with caution. Further studies with a larger sample size are needed.

With regards to the exchange of material goods for sex with a casual partner, a relatively low level of agreement was observed between the survey and diary. Furthermore, although not significant, this behavior was under-reported in the survey. If these participants regularly exchange material goods with a casual partner, this behavior may be more easily forgettable, and recall error may explain the discrepant findings. However, the observed difference could also be due to the sensitive nature of the question and participants not feeling comfortable reporting such behaviors. As discussed by Torangeau *et al.*, questions are considered sensitive if the question itself is seen as an invasion of privacy or if the question raises concerns about disapproval or other negative consequences if answered truthfully [23]. Also, as discussed by Catania *et al.* [6], participants may feel threatened by questions regarding behaviors which

they feel are socially undesirable. The mode of data collection could also influence disclosure [5, 6, 24, 25]. During focus group sessions, participants were asked whether they would be more truthful in reporting behaviors in the diary or survey. Although many reported both would elicit truthful responses, most preferred the diary. Several participants reported they felt compelled to truthfully record their behaviors in the diary, including when they had purchased sex from a sex worker. Further research in this population is needed regarding reporting behaviors with different types of sexual practices and different modes of data assessment.

When comparing the total number of days a participant engaged in sex during the two week data collection period, estimates were nearly identical between the survey and diary. Additionally, the frequency of sex and CURs for non-spousal partners did not differ substantially by the two reporting methods. These findings may be explained by framing survey and diary questions by the different partner types, which helped with the recall of past behaviors [16]. Other reasons include the provision of a calendar to participants during the survey administration and the use of concrete dates in the diary for the reporting period, which could help reduce recall errors [8]. These findings could also be due to the short time frame in which the survey was administered relative to the diary, and the actual completion of the prospective diary, which may have enhanced the participant's memory. Further studies with longer recall periods (e.g., 3 or 6 months) are needed to better assess the effects of time.

Comparisons of retrospective condom use frequencies from the survey to the corresponding CUR from the diary suggest that the level of agreement between the

two diminish as we move further away from the always category. Among those who reported always using condoms on the survey, the corresponding CURs from the diary were relatively high. However, for those who reported occasionally using condoms, the level of disagreement was substantial, suggesting the selected response may not reflect actual usage. There was also much variability observed in the interpretation of the retrospective condom use categories, as shown in other studies [19, 26, 27]. Among participants who reported always using condoms, the CUR ranged from 91.7–100%, suggesting that some did not interpret "always" as using condoms 100% of the time. As discussed by Cecil *et al.* [26], the term "always" or "never" may not be viewed as absolute, but rather as a range of behaviors with exceptions. The most variability in the interpretation of the retrospective categories was observed among those who reported using condoms most times or occasionally. These inconsistencies could be due to participants reporting their typical condom use behaviors, and not actual behaviors that were reported in the diaries. Other reasons include not providing a percentage range to the categories, leaving each one open to interpretation. Ways to improve the accuracy of collecting condom use frequency from a retrospective survey include adding verbal clarification [26] or incorporating percentiles to each response category [27].

As with most sexual behavior research that relies on self-reported data, it is extremely difficult to determine the accuracy of the collected data. Some studies have used biological assessments to confirm self-reports of condom use [1] and recent sexual activity [28], while others have examined the reliability of self-reported sexual behaviors obtained from couples [29, 30]. However, biological measurements are not

always feasible and may discourage participation, and recruiting couples to participate in studies poses numerous challenges in itself. To reduce respondent bias, confidentiality measures were in place to ensure privacy during the survey administration and participants were informed they could skip questions they were not comfortable answering. No personal identifiers were collected from the diaries. Respondent bias was discussed in the focus group sessions, with most participants indicating they felt comfortable and were honest in reporting their behaviors in both data collection modalities.

For this study, the diary was considered the "gold standard", as data was collected prospectively. Although participants were instructed to complete the diary on a daily basis, some may not have done this; therefore, prospective data collection may have been compromised. However, participants would only have had to recall events that occurred at most, two weeks ago. Participants were asked to maintain a sexual behavior diary for two weeks at a time, which may not have been long enough to capture "average" behaviors. Critics may argue that the proximity in which the retrospective survey was administered following the diaries was too close, which may help explain the convergence of many reported behaviors. Further studies with a larger sample size, longer data collection period, longer lapse in time between the administration of the survey and diary, and questions asking about cultural norms influencing the reports of sexual practices should be explored.

In summary, this study found that most sexual behaviors reported in the retrospective survey were similar to those found in the prospective diary, with the exception of behaviors associated with having a regular partner, reports of exchanging

material goods for sex with a casual partner, and reports of some retrospective condom use categories. These results suggest that retrospective surveys are useful for measuring recent sexual behaviors, although prospective diaries may be more reliable in collecting routine and sensitive sexual practices. When using a retrospective survey, researchers should consider incorporating memory tools (e.g., calendar) and appropriate question formatting techniques (e.g., partner-by-partner approach) to help participants better remember their past behaviors and more accurately categorize their condom use behaviors (e.g., adding percentiles to each condom use frequency category). Due to strict participant eligibility criteria, study results may only be generalizable to BDF members of comparable age. Further studies in this military, as well as other militaries, are needed to better understand reporting behaviors, cultural and social norms that may affect reporting, and to evaluate other data collection methods that many increase reporting accuracy.

Acknowledgments

Chapter 4, in part, is currently being prepared for submission for publication of the material. Thomas, Anne; Vaida, Florin; Ditsela, Mooketsi; Phetogo, Robert; Kelapile, David; Chambers, Christina; Haubrich, Richard; Shaffer, Richard. The dissertation author was the primary author of this material.

Table 4.1 Demographic characteristics of 161 study participants

Variable	n	(%)
Age in years, Mean (SD)	25.3	(2.4)
Marital status		
Single, never married	133	(82.6)
Married	2	(1.2)
Cohabitating	26	(16.2)
Education		
Primary	0	(0)
Junior secondary	1	(0.6)
Senior secondary	116	(72.1)
Tertiary	37	(23.0)
Vocational	7	(4.4)
Religion		
Christian	133	(82.6)
Traditional	8	(5.0)
African Traditional	6	(3.7)
No religious affiliation	13	(8.1)
Other non-Christian	1	(0.6)
Military rank		
Private	78	(48.5)
Junior NCO[a]	74	(46.0)
Warrant Officer/Senior NCO[a]	0	(0)
Junior Officer	9	(5.6)
Military unit		
Air Arm	0	(0)
Fighting	56	(34.8)
Logistics	60	(37.3)
Support	45	(28.0)
Cadets	0	(0)
Trainers	0	(0)
Years in the military , Mean (SD)	4.2	(2.4)

[a]Non-commissioned officer

Table 4.2 Comparisons of reported partner types and exchange of material goods for sex with a casual partner between the prospective diary and retrospective survey

			Reported types of sexual partners			
Reported in		Spouse (N = 161)	Regular cohabitating (N = 161)	Regular non-cohabitating (N = 161)	Casual (N = 161)	Exchanged material goods for sex with a casual partner[a] (N = 56)
Diary	Survey	n (%)	n (%)	n (%)	n (%)	n (%)
Yes	No	9 (5.6)	13 (8.1)	7 (4.3)	13 (8.1)	12 (21.4)
No	Yes	2 (1.2)	8 (5.0)	19 (11.8)	12 (7.5)	6 (10.7)
% Total disagreement		6.8	13.1	16.1	15.6	32.1
Yes	Yes	4 (2.5)	59 (36.6)	86 (53.4)	56 (34.8)	5 (8.9)
No	No	146 (90.7)	81 (50.3)	49 (30.4)	80 (49.7)	33 (58.9)
% Total agreement		93.2	86.9	83.8	84.5	67.8
Kappa		0.39	0.73	0.66	0.68	0.16
95 % CI		(0.11, 0.67)	(0.63, 0.84)	(0.54, 0.78)	(0.57, 0.80)	(-0.11, 0.42)
p-value		<0.001	<0.001	<0.001	<0.001	0.22
McNemar's statistic		4.45	1.19	5.54	0.04	2.00
p-value		0.03	0.27	0.02	0.84	0.16

[a]Only includes those who reported having sex with a casual partner in both the diary and survey

Table 4.3 Comparisons of sexual activity and condom use behaviors reported in the prospective diary and retrospective survey

Variable	n	Diary Mean (SD)	Survey Mean (SD)	Mean Difference[b]	95 % CI of Mean Difference	p-value	r of survey and diary	95% CI of r	p-value
Total days, of 2 weeks, participant had sex	160	4.29 (2.56)	4.53 (2.69)	-0.24	(-0.57, 0.10)	0.17	0.66	(0.57, 0.74)	<0.001
Overall frequency of sex	158	7.19 (5.75)	6.71 (5.42)	0.48	(-0.41, 1.37)	0.29	0.49	(0.36, 0.60)	<0.001
Frequency of sex by partner									
Spouse	3	4.33 (2.08)	2.33 (1.53)	2.00	(-4.57, 8.57)	0.32	-0.05	–[c]	0.97
Regular cohab.	56	5.13 (4.16)	5.34 (5.00)	-0.21	(-1.26, 0.83)	0.68	0.65	(0.47, 0.78)	<0.001
Regular non-cohab.	81	5.60 (4.50)	5.43 (4.46)	0.17	(-0.69, 1.04)	0.69	0.62	(0.47, 0.74)	<0.001
Casual	55	3.85 (2.48)	3.29 (2.35)	0.56	(-0.08, 1.20)	0.08	0.52	(0.30, 0.69)	<0.001
Overall condom use rate[a]	143	94.69 (14.93)	92.31 (18.21)	2.37	(-0.62, 5.37)	0.12	0.42	(0.27, 0.54)	<0.001
Condom use rate[a] by partner									
Spouse	3	81.11 (20.09)	83.33 (28.87)	-2.22	(-35.69, 31.24)	0.80	0.91	–[c]	0.27
Regular cohab.	53	88.81 (23.80)	88.58 (25.54)	0.23	(-5.73, 6.19)	0.94	0.62	(0.42, 0.76)	<0.001
Regular non-cohab.	76	95.34 (17.19)	93.66 (19.31)	1.68	(-1.78, 5.14)	0.34	0.66	(0.51, 0.77)	<0.001
Casual	53	98.74 (9.16)	97.48 (14.40)	1.26	(-2.76, 5.27)	0.53	0.30	(0.03, 0.53)	0.029

[a]Percent use rate among those who reported having sex

[b]Mean difference = diary estimate– survey estimate

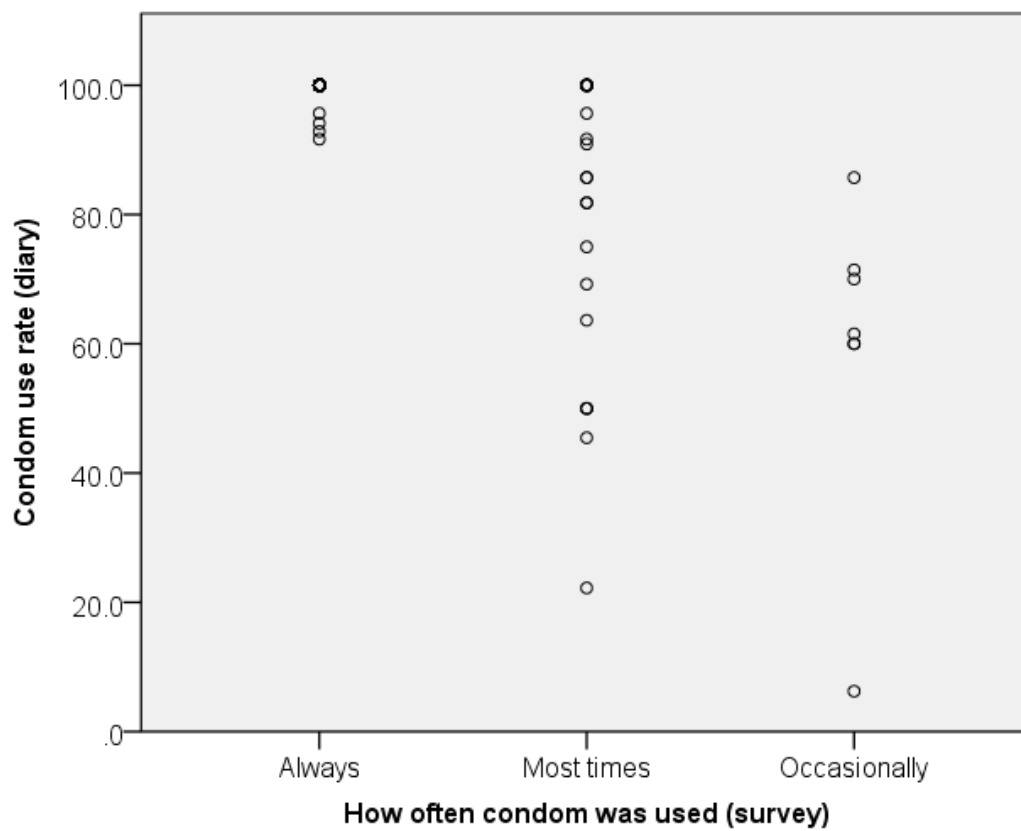[c]Due to small samples, the confidence interval was not computed

Figure 4.1 Comparisons of condom use frequency reported in the retrospective survey versus condom use rates calculated from the prospective diary (N = 147)

References

1.   Allen S, Meinzen-Derr J, Kautzman M, Zulu I, Trask S, Fideli U, *et al.* Sexual behavior of HIV discordant couples after HIV counseling and testing. *AIDS* 2003,17:733–740.

2.   Gillmore MR, Leigh BC, Hoppe MJ, Morrison DM. Comparison of daily and retrospective reports of vaginal sex in heterosexual men and women. *Journal of sex research* 2010,47:279–284.

3.   Voeten HA, Egesah OB, Varkevisser CM, Habbema JD. Female sex workers and unsafe sex in urban and rural Nyanza, Kenya: regular partners may contribute more to HIV transmission than clients. *Tropical medicine & international health : TM & IH* 2007,12:174–182.

4.   Graham CA, Catania JA, Brand R, Duong T, Canchola JA. Recalling sexual behavior: a methodological analysis of memory recall bias via interview using the diary as the gold standard. *Journal of sex research* 2003,40:325–332.

5.   Schroder KE, Carey MP, Vanable PA. Methodological challenges in research on sexual risk behavior: II. Accuracy of self-reports. *Annals of behavioral medicine : a publication of the Society of Behavioral Medicine* 2003,26:104–123.

6.   Catania JA, Gibson DR, Chitwood DD, Coates TJ. Methodological problems in AIDS behavioral research: influences on measurement error and participation bias in studies of sexual behavior. *Psychological bulletin* 1990,108:339–362.

7.   McLaws M, Oldenburg B, Ross M, Cooper D. Sexual behaviour in AIDS-related research: Reliability and validity of recall and diary measures. *The Journal of Sex Research* 1990,27:265–281.

8.   Weinhardt LS, Forsyth AD, Carey MP, Jaworski BC, Durant LE. Reliability and validity of self-report measures of HIV-related sexual behavior: progress since 1990 and recommendations for research and practice. *Archives of sexual behavior* 1998,27:155–180.

9.   Reading A. A comparison of the accuracy and reactivity of methods monitoring male sexual behavior. *Journal of Psychopathology and Behavioral Assessment* 1983,5:11–23.

10.   Boekeloo BO, Schiavo L, Rabin DL, Conlon RT, Jordan CS, Mundt DJ. Self-reports of HIV risk factors by patients at a sexually transmitted disease clinic: audio vs written questionnaires. *Am J Public Health* 1994,84:754–760.

11. Durant LE, Carey MP. Self-administered questionnaires versus face-to-face interviews in assessing sexual behavior in young women. *Arch Sex Behav* 2000,29:309–322.

12. Saltzman SP, Stoddard AM, McCusker J, Moon MW, Mayer KH. Reliability of self-reported sexual behavior risk factors for HIV infection in homosexual men. *Public Health Rep* 1987,102:692–697.

13. Catania J, McDermott L, Pollack L. Questionnaire response bias and face-to-face interview sample bias in sexuality research. *Journal of sex research* 1986,22:52–72.

14. Leigh BC, Gillmore MR, Morrison DM. Comparison of diary and retrospective measures for recording alcohol consumption and sexual activity. *J Clin Epidemiol* 1998,51:119–127.

15. Ramjee G, Weber AE, Morar NS. Recording sexual behavior: comparison of recall questionnaires with a coital diary. *Sex Transm Dis* 1999,26:374–380.

16. McAuliffe TL, DiFranceisco W, Reed BR. Effects of question format and collection mode on the accuracy of retrospective surveys of health risk behavior: a comparison with daily sexual activity diaries. *Health Psychol* 2007,26:60–67.

17. Coxon AP. Parallel accounts? Discrepancies between self-report (diary) and recall (questionnaire) measures of the same sexual behaviour. *AIDS Care* 1999,11:221–234.

18. Downey L, Ryan R, Kulich M. How Could I Forget? Inaccurate memories of sexually intimate moments. *The Journal of Sex Research* 1995,32:177–191.

19. Hoppe MJ, Morrison DM, Gillmore MR, Beadnell B, Higa DH, Leigh BC. Agreement of daily diary and retrospective measures of condom use. *AIDS Behav* 2008,12:113–117.

20. Kapiga SH, Lugalla JL. Male condom use in Tanzania: results from a national survey. *East Afr Med J* 2003,80:181–190.

21. Mnyika KS, Klepp KI, Kvale G, Ole-Kingori N. Determinants of high-risk sexual behaviour and condom use among adults in the Arusha region, Tanzania. *Int J STD AIDS* 1997,8:176–183.

22. Landis JR, Koch GG. The measurement of observer agreement for categorical data. *Biometrics* 1977,33:159–174.

23.   Tourangeau R, Smith TW. Asking sensitive questions - The impact of data collection mode, question format, and question context. *Public Opinion Quarterly* 1996,60:275–304.

24.   Fenton KA, Johnson AM, McManus S, Erens B. Measuring sexual behaviour: methodological challenges in survey research. *Sexually transmitted infections* 2001,77:84–92.

25.   Bowling A. Mode of questionnaire administration can have serious effects on data quality. *Journal of public health* 2005,27:281–291.

26.   Cecil H, Zimet GD. Meanings assigned by undergraduates to frequency statements of condom use. *Archives of sexual behavior* 1998,27:493–505.

27.   Jaccard J, McDonald R, Wan CK, Dittus PJ, Quinlan S. The accuracy of self-reports of condom use and sexual behavior. *Journal of Applied Social Psychology* 2002,32:1863–1905.

28.   Minnis AM, Steiner MJ, Gallo MF, Warner L, Hobbs MM, van der Straten A*, et al.* Biomarker validation of reports of recent sexual activity: results of a randomized controlled study in Zimbabwe. *American journal of epidemiology* 2009,170:918–924.

29.   Lagarde E, Enel C, Pison G. Reliability of reports of sexual behavior: a study of married couples in rural west Africa. *American journal of epidemiology* 1995,141:1194–1200.

30.   de Boer MA, Celentano DD, Tovanabutra S, Rugpao S, Nelson KE, Suriyanon V. Reliability of self-reported sexual behavior in human immunodeficiency virus (HIV) concordant and discordant heterosexual couples in northern Thailand. *American journal of epidemiology* 1998,147:1153–1161.

CHAPTER 5

Discussion and Conclusions

Overview

This dissertation was undertaken to better understand sexual and condom use behaviors among Botswana Defence Force (BDF) military personnel, a population at increased risk for HIV. In particular, the following questions were addressed: 1) Are BDF military personnel using condoms? If they are not using condoms, why are they not using them? 2) What factors are associated with lower condom use in the BDF? 3) Is there anything we can do to increase condom use among BDF military personnel? 4) Do different data collection methods affect reporting of sexual activity and condom use behaviors among the BDF?

Results could be used to evaluate the effectiveness of existing HIV prevention programs, identify key program areas that need modification, and develop other behavioral interventions and policies aimed at reducing the number of HIV infections in the BDF military. Findings could also be used to tailor data collection methods regarding sexual and condom use behaviors among BDF military personnel.

Current Condom Use Behaviors in the BDF

Results from the analysis of baseline data demonstrate that inconsistent condom use is relatively common among BDF military personnel. Only 51% of participants reported always using condoms with their sexual partners. Although inconsistent condom use has been reported in other African militaries [1-3], these observations are especially alarming, given the high HIV prevalence (17.6%) in Botswana [4], and the high percentage (69.1%) of participants reporting having more than one sexual partner.

Consistent with other studies [5-7], results show that condom use varied by partner type. Condom use was typically higher with casual partners than with regular partners. Individuals involved in multiple sexual partnerships who are not consistently using condoms may be putting themselves and their sexual partners at higher risk for HIV. These data reinforce the need to increase HIV prevention messages of correct and consistent condom use with all sexual partners, and to target these messages among BDF members involved in multiple sexual partnerships.

The most commonly reported reasons why BDF participants did not use condoms included condoms make sex less enjoyable (17.5%), trust for a sexual partner (13.7%), and condoms smell bad (6.2%). Reported trust for a sexual partner and the perception that condoms reduce sexual pleasure were further identified as significant correlates of lower condom use. Although the belief that condoms smell bad was not associated with lower condom use in the multivariate model, these data still support anecdotal reports that the BDF government-issued condoms were often not used because of an unpleasant odor.

The observed association between trust for a sexual partner and lower condom use was interesting. While nearly 100% of participants agreed that using a condom shows that you care for your partner, most were not using condoms consistently, since suggesting condom use could indicate that a partner has not been faithful or is not committed to the relationship. Further qualitative studies among military personnel are needed to better understand the complex relationship between trust and condom use and to develop appropriate HIV prevention messages regarding these issues.

Excessive alcohol use is a problem in the BDF, with almost 60% of participants identified as problem drinkers. Problem alcohol use was also found to be associated with lower condom use. HIV prevention messages in the BDF should address alcohol abuse and risky behaviors, to include refraining from consuming large amounts of alcohol before sex and reinforcing the need for correct and consistent condom use. Other potential preventive measures include supporting the current Botswana government initiatives in increasing tax on alcoholic purchases, limiting alcohol availability on the military bases, and providing free condoms where alcohol is sold. In addition, the BDF should bolster and increase alcohol abuse prevention, treatment, and rehabilitation programs within their military.

Although negative predictors of condom use were identified, this study also found that being circumcised and higher levels of HIV knowledge were found to be associated with more frequent condom use. However, higher HIV knowledge does not necessarily translate into actual practice of safe sexual behaviors [8]. While nearly 100% of participants correctly answered that HIV transmission can be reduced by using condoms, only half of participants reported always using condoms, suggesting that HIV knowledge alone may not be enough to prevent HIV infection.

Increasing Condom Use in the BDF

The examination of baseline data supports the need to increase condom use in the BDF. In an effort to do so, an intervention study was conducted to investigate whether scented condoms and condoms packaged in a camouflage wrapper would increase condom use. It was suggested by the BDF that providing condoms with these particular characteristics may help increase usage.

Results demonstrate that condom use rates (CURs) increased significantly with the introduction of the intervention condom. These findings suggest that conducting formative work regarding condoms and usage in the target population was highly beneficial. Other studies have demonstrated the beneficial uses of condom social marketing techniques [9, 10]. The observed increase in condom use could also be due to the physical distribution of condoms to the participants, which may have helped promote condom awareness and use. Although BDF government-issued condoms are available at many different sources where members could take them when needed, the BDF command should consider routinely distributing condoms to their members during troop formation or other occasions, where appropriate.

Findings suggest that the intervention had a larger impact on participants who were lower educated compared to those who were higher educated. As with any multi-dimensional intervention, it may be difficult to "tease out" which aspects of the intervention had the most impact. Participants who were less educated may have become more aware of their sexual and condom use behaviors simply by recording them in a diary, and as a result may have changed their behaviors over time. Further research with regards to condom use in this group is needed.

Results demonstrate that the blue and camouflage wrappers had a significant impact on condom use, with rates increasing over time for both groups. However, there was a differential increase in CURs by the wrapper type. The change in CURs over time was substantially steeper for those who received the camouflage wrappers, suggesting the camouflage wrapper had a larger impact on condom use. Furthermore, data also found a significant association between condom scent and usage, with CURs

higher among participants who reported using scented condoms. These results demonstrate that condom-wrapper graphics and scent may influence condom usage.

Reporting Sexual and Condom Use Behaviors in the BDF

Assessments of sexual behaviors (i.e., sexual activity and condom use) rely substantially on self-reports. If is therefore important to consider the population of interest in determining which data collection modality will be most effective in collecting reliable and valid sexual behavior data.

Comparisons of reported sexual behavior from a retrospective survey relative to a prospective diary found that most sexual behaviors reported were similar between the two data methods. However, there were some notable differences. Interestingly, low levels of agreement between the two modalities were observed for sexual behaviors related to a regular partner. Inaccurate reporting may be more typical among those who have a regular partner, as sexual behaviors practiced in this form of relationship may be more routine, less salient, and more easily forgettable. Studies show recall error, in the form of over- and under-reporting, may be more prevalent with behaviors that occur more regularly or frequently [11, 12].

Regarding the exchange of material goods for sex with a casual partner, a relatively low level of agreement above chance was observed between the survey and diary and this behavior was under-reported in the survey. If these participants regularly exchange material goods with a casual partner, this behavior may be more easily forgettable, and recall error may explain the discrepant findings. However, if the participant considered this question too sensitive or obtrusive, they may have provided a socially desirable response on the retrospective survey.

In comparisons of retrospective condom use frequencies from the survey to the corresponding CUR from the diary, we found the level of agreement between the two diminished as we moved further away from the "always" category. For those who reported occasionally using condoms, the level of disagreement between the two modalities was substantial, suggesting the selected response may not truly reflect actual usage. We also found substantial variability in the interpretation of the retrospective categories among those who reported using condoms less than always.

Conclusion

The analysis of baseline data highlighted several problematic areas concerning condom use in the BDF, and provided better insight regarding factors associated with lower condom use. Interestingly, while most Botswana Defence Force (BDF) participants (99.5%) correctly answered that HIV can be prevented by using condoms, inconsistent condom use was still a problem. While prevention messages regarding correct and consistent condom use as an effective method against HIV are highly important, most participants are aware of this and are still not using condoms. These results suggest there may be other important factors that may explain lower condom use among BDF personnel. As demonstrated in this study, alcohol abuse and reported trust for a sexual partner were identified as significant correlates of lower condom use. However, the perception that condoms make sex less enjoyable was the correlate most strongly associated with lower condom use. These findings suggest that it would be beneficial to focus on reasons why condoms make sex less enjoyable, including the physical characteristics of a condom that discourages use.

As observed in this dissertation, a recurring theme among BDF military personnel was the importance of the condom scent and the appearance of the wrapper. While over 80% of participants reported they would use condoms more often if they were available for free, anecdotal evidence indicated that government-issued condoms were often not used due to an unpleasant scent and the unappealing wrapper. These results suggest that participants view the government-issued condoms as a "consumer product" and they have a choice to use them or not. Similar to other consumables, such as health or household products, conducting social marketing research regarding the government-issued condoms in the target population of interest may be beneficial. As demonstrated in this study, the success of the intervention condom was most likely due to formative work conducted by the BDF and PSI regarding which condom should be used. These findings have important implications regarding the direction and focus of HIV prevention programs. Although prevention messages are still tremendously important, allocating funds towards condom social marketing may be a more effective way to increase condom use levels long term.

This dissertation also provided insight about reporting behaviors regarding sexual practices among military personnel. In Botswanan culture, it is typically considered inappropriate to openly talk about sex, due to respect for family and kinship relationships and its procreative power [13]. However, this dissertation shows that soldiers are willing to disclose their sexual behaviors in a diary and survey. But of interest is whether the information provided by participants may be perceived as the absolute truth or merely an indication of consistent reporting. Furthermore, when reported behaviors do not converge between the diary and survey, in which data

collection modality was the information more accurate? The confirmation of truthful sexual behavior reporting is very difficult. However, data from the focus group discussions indicate that participants were compelled to be honest about their behaviors because they were participating in the study; therefore, we are inclined to believe that participants were truthfully disclosing their behaviors, for the most part. The focus group sessions also indicate that most participants were honestly reporting in the survey and diary but the majority preferred the diary due to contemporaneous data collection and a lack of retrospective recall; therefore, we are inclined to believe that diary data may have been more accurate because participants weren't asked to recall behaviors that occurred a while ago. However, we must also accept the possibility that participants may not have truthfully disclosed information regarding sexual practices in which they considered sensitive or socially undesirable in either the survey or diary. In summary, these data highlight the importance of investigating the best data collection strategy to effectively answer the research question of interest, while taking the study population into consideration.

In conclusion, this dissertation allowed us to better understand sexual and condom use behaviors in the BDF and identify innovative ways to increase condom use in this population. It also provided better insight regarding reporting behaviors among BDF personnel. We hope this dissertation will serve as a valuable source of information for other militaries and researchers who are committed to reducing the impact of HIV/AIDS among military personnel and keeping these forces healthy.

References

1.   Bakhireva LN, Abebe Y, Brodine SK, Kraft HS, Shaffer RA, Boyer CB. Human immunodeficiency virus/acquired immunodeficiency syndrome knowledge and risk factors in Ethiopian military personnel. *Mil Med* 2004,169:221-226.

2.   Nwokoji UA, Ajuwon AJ. Knowledge of AIDS and HIV risk-related sexual behavior among Nigerian naval personnel. *BMC Public Health* 2004,4:24.

3.   Okulate GT, Jones OB, Olorunda MB. Condom use and other HIV risk issues among Nigerian soldiers: challenges for identifying peer educators. *AIDS Care* 2008,20:911-916.

4.   Central Statistics Office & National AIDS Coordinating Agency. 2008 Botswana AIDS Impact Survey III. In. Gaborone: Central Statistics Office; 2009.

5.   Macaluso M, Demand MJ, Artz LM, Hook EW, 3rd. Partner type and condom use. *AIDS* 2000,14:537-546.

6.   Westercamp N, Mattson CL, Madonia M, Moses S, Agot K, Ndinya-Achola JO*, et al.* Determinants of consistent condom use vary by partner type among young men in Kisumu, Kenya: a multi-level data analysis. *AIDS Behav* 2010,14:949-959.

7.   Bing EG, Ortiz DJ, Ovalle-Bahamon RE, Cheng KG, Huang FH, Ernesto F*, et al.* HIV/AIDS behavioral surveillance among Angolan military men. *AIDS Behav* 2008,12:578-584.

8.   Maswanya ES, Moji K, Horiguchi I, Nagata K, Aoyagi K, Honda S*, et al.* Knowledge, risk perception of AIDS and reported sexual behaviour among students in secondary schools and colleges in Tanzania. *Health education research* 1999,14:185-196.

9.   Cohen DA, Farley TA, Bedimo-Etame JR, Scribner R, Ward W, Kendall C*, et al.* Implementation of condom social marketing in Louisiana, 1993 to 1996. *American journal of public health* 1999,89:204-208.

10.   Van Rossem R, Meekers D. The reach and impact of social marketing and reproductive health communication campaigns in Zambia. *BMC Public Health* 2007,7:352.

11.   Catania JA, Gibson DR, Chitwood DD, Coates TJ. Methodological problems in AIDS behavioral research: influences on measurement error and participation bias in studies of sexual behavior. *Psychological bulletin* 1990,108:339-362.

12.   Schroder KE, Carey MP, Vanable PA. Methodological challenges in research on sexual risk behavior: II. Accuracy of self-reports. *Annals of behavioral medicine : a publication of the Society of Behavioral Medicine* 2003,26:104-123.

13.   Heald S. Abstain or die: the development of HIV/AIDS policy in Botswana. *Journal of biosocial science* 2006,38:29-41.

APPENDIX

Participant Recruitment Flyer

OPPORTUNITY TO PARTICIPATE IN BDF STUDY

The Botswana Defense Force, in collaboration with the US Department of Defense HIV/AIDS Prevention Program, invites you to participate in a study about sexual behavior among active duty military personnel.

You are eligible to participate if you are:
- Male soldier between the ages of 18 and 30
- Sexually active

Participation in this study will involve six study visits and providing information about your sexual behaviors in a survey and diary.
All information collected is strictly confidential.

If you are eligible and interested in participating in this study, please attend the informational meeting on:

Date: *****
Time: *****
Location: *****

If you would like further information, or have any questions about the study, please contact:

Study Coordinator: *****
Telephone: *****
Email: *****

Date Posted: *****

Site Coordinator: Mobile: Email:	Site Coordinator: Mobile: Email:	Site Coordinator: Mobile: Email:	Site Coordinator: Mobile: Email:	Site Coordinator: Mobile: Email:	Site Coordinator: Mobile: Email:	Site Coordinator: Mobile: Email:	Site Coordinator: Mobile: Email:	Site Coordinator: Mobile: Email:	Site Coordinator: Mobile: Email:	Site Coordinator: Mobile: Email:

Baseline Survey

2010 Botswana Defense Force Risk Questionnaire
(Men – Baseline)

Tick ☑ one box only to indicate your site location:

☐	Mil. Garrison 1	☐	Village
☐	Mil. Garrison 2	☐	TAB
☐	Sector Base	☐	Maun
☐	EMG	☐	Pitsane
☐	SSKB	☐	Pandamatenga
☐	Glen Valley	☐	Paje

Date of interview: Day: __ __
Month: __ __
Year: __ __ __ __

Instructions:
As the interviewer reads the questions out loud, please follow along with this document and tick the box next to the appropriate answer or write in your answer in the space provided. For each question, tick one box only, unless it is specified that you should tick more than one box that best applies to you.

Please remember that your answers to this survey are completely confidential so please answer as honestly as possible. If you have any questions or problems, please raise your hand and a staff member will come over to assist you.

Instructions to all participants: Tick ☑ one box only, unless otherwise specified, or write your answer in the space provided.

Section 1. Demographic Information Sheet

101. What is your age? _____ years old

102. What is your date of birth?
Day: __ __
Month: __ __
Year: __ __ __ __

103. What is the highest education level that you have attained? Tick ☑ one box only.

☐ Primary
☑ Junior Secondary
☑ Senior Secondary
☑ Tertiary
☐ Vocational

104. What is your religious affiliation? Tick ☑ one box only.

☐ Christian (all Christian sects)
☑ Muslim
☑ Traditional
☐ African Traditional
☐ No religious affiliation
☐ Other (non-Christian) → Please specify: _____

105. Which of the following best describes your marital status? Tick ☑ one box only.

☐ Single, never married
☐ Married
☐ Cohabitating
☐ Divorced
☐ Separated
☑ Widowed

106. Which of the following best describes your living status?

☐ Living alone
☑ Living with peers
☐ Living with family
☐ Living with sexual partner

Page 2 of 14

Section 2. Military Background

201.   What is your rank in the military? Tick ☑ one box only.

☐ Private
☐ Junior NCO
☐ Warrant Officer/Senior NCO
☐ Junior Officer
☐ Senior Officer

202.   What military unit are you in? Tick ☑ one box only.

☐ Air Arm
☐ Fighting
☐ Logistics
☐ Support
☐ Cadets
☐ Trainers

203.   How many <u>years</u> have you been in the military? _____ years

Section 3. Sexual Behavior History, Recognition of the Impact of HIV/AIDS, and Perception of Risk of Infection

The next questions ask about your sexual partners and HIV/AIDS. Please try to answer as honestly as possible. Remember, your answers will remain strictly confidential. For this survey, "sexual intercourse" means both vaginal and anal sex.

301.   Have you ever had sexual intercourse? Tick ☑ one box only.

☐ Yes
☐ No

302.   How old were you the first time you had sexual intercourse?

_____ years old   ☐ Don't know   ☐ Not applicable, I have never had sex

303.   Roughly how many sexual partners have you had in your lifetime,? If you have never had sexual intercourse, write "0".

_____ partners

304.   Definition: "Regular partners" include your wife, girlfriend or any person with whom you have had sex more than twice or with whom the sexual relationship has lasted more than one year.

In the past 12 months, how many regular partners, including your wife, did you have sex with? If you haven't had sex with any regular partners in the past 12 months, write "0".

_____ regular partners

305.   Definition: "Casual partners" include those that you have had sex with only 1 or 2 times. This does not include your regular partners.

In the past 12 months, how many casual partners did you have sex with? If you haven't had sex with any casual partners in the past 12 months, write "0".

_____ casual partners

306.   In the past 3 months, have you had sexual intercourse? Tick ☑ one box only.

☐ Yes
☐ No

307.   In the past 3 months, how many different people have you had sex with?
If you haven't had sex in the past 3 months, write "0".

_____ different people

Page 4 of 14

We would like to collect some information about **your most recent partner** in the **last 3 months**. Start with the <u>most</u> recent partner. Tick ☑ one box only unless otherwise specified. <u>If you did not have sexual intercourse in the last three months, leave this section blank.</u>

307a1. The most recent partner during the last three months was:

☐ Spouse, cohabitating, or regular
☒ Casual
☐ Other (specify):_____

307a2. Was this a new partner in the <u>last 3 months</u>?

☐ Yes   ☒ No

307a3. How often was a condom used with this partner in the <u>last 3 months</u>?

☐ Always   ☒ Never
☐ Most times   ☐ Don't know
☐ Occasionally

307a4. Was a condom used the <u>last time</u> you had sex with this partner?

☐ Yes   ☒ No   ☐ Don't know

307a5. The <u>last time</u> you had sex with this partner, did you drink alcohol before having sex?

☐ Yes   ☒ No   ☐ Don't know

307a6. Was this partner's HIV status positive, negative, or unknown?

☐ HIV +
☐ HIV -
☐ Unknown

307a7. Where were you the <u>last time</u> you had sex with this partner? Tick ☑ <u>all</u> that apply.

☐ Night club   ☒ Barracks
☐ Vehicle   ☒ Other → Please specify: _____
☐ Bar   ☒ Don't know
☐ House party
☐ Own home
☐ Partner's location

307a8. The <u>last time</u> you had sex with this partner, did you receive or give gifts or other material goods in exchange for sex with this partner?

☐ Yes   ☒ No   ☐ Don't know

If you have had more than one sexual partner in the **last 3 months**, fill out this section for the **second most recent partner**. <u>If you do not have a second partner, leave this section blank.</u> Tick ☑ one box only unless otherwise specified.

307b1.   The <u>second</u> most recent partner during the last three months was:

☐ Spouse, cohabitating, or regular
☑ Casual
☐ Other (specify):_____

307b2. Was this a new partner in the <u>last 3 months</u>?

☐ Yes   ☑ No

307b3. How often was a condom used with this partner in the <u>last 3 months</u>?

☐ Always   ☑ Never
☑ Most times   ☐ Don't know
☑ Occasionally

307b4. Was a condom used the <u>last time</u> you had sex with this partner?

☐ Yes   ☑ No   ☐ Don't know

307b5. The <u>last time</u> you had sex with this partner, did you drink alcohol before having sex?

☐ Yes   ☑ No   ☐ Don't know

307b6. Was this partner's HIV status positive, negative, or unknown?

☐ HIV +
☑ HIV -
☐ Unknown

307b7. Where were you the <u>last time</u> you had sex with this partner? Tick ☑ <u>all</u> that apply.

☐ Night club   ☑ Barracks
☑ Vehicle   ☑ Other → Please specify: _____
☑ Bar   ☑ Don't know
☑ House party
☑ Own home
☑ Partner's location

307b8. The <u>last time</u> you had sex with this partner, did you receive or give gifts or other material goods in exchange for sex with this partner?

☐ Yes   ☑ No   ☐ Don't know

308. The <u>last time</u> you had sexual intercourse, did you know your own HIV status?
Tick ☑ one box only.

- ☐ Yes
- ☐ No

309. What do you think <u>a soldier</u> can do to avoid getting HIV/AIDS?
Tick ☑ <u>all</u> boxes that apply.

- ☐ Abstain from sexual contact
- ☐ Use condoms
- ☐ Be faithful to one partner
- ☐ Get tested for HIV
- ☐ Get educated about the disease

- ☐ Reduce/limit the number of sexual partners
- ☐ Use gloves if in contact with blood

- ☐ Avoid kissing
- ☐ Only use clean needles and syringes
- ☐ Don't share razors
- ☐ Seek protection from a traditional healer
- ☐ There is nothing you can do to avoid getting HIV/AIDS
- ☐ Other (specify)_____
- ☐ Don't know

310. How many people in your unit have you ever known who has or had HIV/AIDS?
Circle the number that best corresponds to your answer:

0   1   2   3   4   5   6   7   8   9   10 or more

- ☐ Don't know
- ☐ Prefer not to answer

311. Have you ever lived with or taken care of someone with HIV/AIDS?

- ☐ Yes
- ☐ No
- ☐ Don't know
- ☐ Prefer not to answer

312. If yes, how were you related to this person(s) with HIV/AIDS that you lived with or took care of? Tick ☑ <u>all</u> that apply.

- ☐ Spouse, staying together, or partner
- ☐ Parent
- ☐ Sibling
- ☐ Other family member

- ☐ Colleague/Unit member

- ☐ Friend or acquaintance
- ☐ Others (specify)_____
- ☐ Don't know
- ☐ Not applicable, I have not lived with or cared for someone with HIV

- ☐ Prefer not to answer

For the next series of questions about HIV, tick ☑ one box only.

313. Can the risk of HIV transmission be reduced by having sex with only one faithful, uninfected partner?

    ☐ Yes
    ☐ No
    ☐ Don't know

314. Can a person get HIV from mosquito bites?

    ☐ Yes
    ☐ No
    ☐ Don't know

315. Can the risk of HIV transmission be reduced by using condoms?

    ☐ Yes
    ☐ No
    ☐ Don't know

316. Can people reduce their chances of getting HIV by not having sex at all?

    ☐ Yes
    ☐ No
    ☐ Don't know

317. Can a person get HIV by sharing a meal with someone who is infected?

    ☐ Yes
    ☐ No
    ☐ Don't know

318. Can people get HIV because of witchcraft or other supernatural means?

    ☐ Yes
    ☐ No
    ☐ Don't know

319. Can people be exposed to HIV infection because of traditional practices?

    ☐ Yes
    ☐ No
    ☐ Don't know

320. Can a healthy-looking person have HIV?

    ☐ Yes
    ☐ No
    ☐ Don't know

Section 4. Utilization and Access to Condoms

401.   Have you ever used a condom? Tick ☑ one box only.

☐ Yes
☐ No

402.   In the <u>last 3 months</u>, how often did you use a condom during sexual intercourse?
Tick ☑ one box only.

☐ Always   ☐ Don't know
☐ Most times   ☐ Not applicable, I did not have sexual intercourse
☐ Occasionally   in the last 3 months
☐ Never

403.   The <u>last</u> time you had sexual intercourse, did you use a condom? Tick ☑ one box only.

☐ Yes
☐ No
☐ Don't know

404.   With whom did you <u>last use</u> a condom? Tick ☑ one box only.

☐ Spouse/Regular partner
☐ Casual partner
☐ Other → Please specify: _____
☐ Don't know
☐ Not applicable, I did not use a condom the last time I had sex

405.   If you <u>do not</u> use condoms, what are the reasons you <u>do not</u> use them?
Please Tick ☑ <u>all</u> boxes that apply.

☐ Condoms make sex less enjoyable   ☐ Partner(s) doesn't want me to use one
☐ Condoms break easily   ☐ I am allergic to condoms
☐ Condoms smell bad   ☐ Condoms are against my religion
☐ Condoms don't fit properly   ☐ Difficult disposal after use
   (too small/too short/too large, etc.) ☐ I want my partner to become pregnant
☐ I trust my partner(s)   ☐ Other (specify) _____
☐ Condoms dampen the mood   ☐ Don't know
☐ Condoms are too expensive   ☐ Not applicable, I don't mind using condoms
☐ I don't have the right brand   ☐ Not applicable, I have never used a condom

406. Where would you get <u>FREE</u> condoms from within your Garrison if you wanted one? Tick ☑ <u>all</u> boxes that apply.

☐1 Condom dispenser   ☐4 Friend or acquaintance
☐2 Peer Educator   ☐5 Others (specify)_____
☐3 HIV/AIDS focal person   ☐6 Unit does not provide free condoms
☐4 Hospital   ☐ Don't know
☐5 Barracks

407. How easy or difficult is it for you to get condoms? Tick ☑ one box only.

☐1 Very easy
☐2 Easy
☐3 Difficult
☐4 Very difficult
☐ Don't know

408. How often do you carry condoms with you, for example in your uniform or wallet? Tick ☑ one box only.

☐1 Always
☐2 Most times
☐3 Occasionally
☐4 Never

409. Please answer each of the following questions by indicating if you agree with the statement, if you disagree with the statement, or if you don't know.
For each statement, tick ☑ one box only.

a. Condoms decrease a man's sexual pleasure.

☐1 Agree
☐2 Disagree
☐ Don't know

b. Condoms are quite convenient to use.

☐1 Agree
☐2 Disagree
☐7 Don't know

c. One condom can be used more than once.

☐1 Agree
☐2 Disagree
☐ Don't know

Page 10 of 14

d. Condoms are effective in preventing HIV infection.

☐ Agree
☐ Disagree
☐ Don't know

e. A man would lose respect if he suggested to a woman that they use a condom.

☐ Agree
☐ Disagree
☐ Don't know

f. A woman would lose respect if she asked a man to use a condom.

☐ Agree
☐ Disagree
☐ Don't know

g. It is embarrassing to buy condoms.

☐ Agree
☐ Disagree
☐ Don't know

h. Using a condom shows that you care for your partner.

☐ Agree
☐ Disagree
☐ Don't know

i. It is alright for a married woman to ask her husband to use a condom.

☐ Agree
☐ Disagree
☐ Don't know

j. It is alright for a married man to use a condom with his wife.

☐ Agree
☐ Disagree
☐ Don't know

k. I would use condoms more often if they were available for free.

☐ Agree
☐ Disagree
☐ Don't know

l. Buying and handling condoms is the man's responsibility.

☐1 Agree
☐2 Disagree
☐7 Don't know

Section 5. Alcohol Use
This section asks about your alcohol use. Please try to answer as honestly as possible.
Remember, your answers will remain strictly confidential.

For the next question (Question 501), here is an example of how to correctly mark your response.

Example:

Place an X in one box that best describes your answer to each question.					
Questions	**0**	**1**	**2**	**3**	**4**
1. How often do you have orange juice?	Never	Monthly or less	2-4 times a month	~~2-3 times a week~~	4 or more times a week
2. How often do you have apple juice?	Never	~~Monthly or less~~	2-4 times a month	2-3 times a week	4 or more times a week

Now let's resume the survey.

501. For each question in the table below, place an "X" in one box only.

For the questions below, one drink is equal to 1 shot of hard liquor (whiskey, vodka, etc.), a regular bottle of beer (340 ml), or a glass of wine. Your answers will remain confidential so please be honest.

Place an X in one box that best describes your answer to each question.

Questions	0	1	2	3	4
1. How often do you have a drink containing alcohol?	Never	Monthly or less	2-4 times a month	2-3 times a week	4 or more times a week
2. How many drinks containing alcohol do you have on a typical day when you are drinking?	1 or 2	3 or 4	5 or 6	7 to 9	10 or more
3. How often do you have six or more drinks on one occasion?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
4. How often during the last 12 months have you found that you were not able to stop drinking once you had started?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
5. How often during the last 12 months have you failed to do what was normally expected of you because of drinking?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
6. How often during the last 12 months have you needed a first drink in the morning to get yourself going after a heavy drinking session?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
7. How often during the last 12 months have you had a feeling of guilt or remorse after drinking?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
8. How often during the last 12 months have you been unable to remember what happened the night before because of your drinking?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
9. Have you or someone else been injured because of your drinking?	No		Yes, but not in the last year		Yes, during the last year
10. Has a relative, friend, doctor, or other health care worker been concerned about your drinking or suggested you cut down?	No		Yes, but not in the last year		Yes, during the last year

502. In the <u>last 3 months</u> when you had sex, how often did you have alcohol less than 2 hours before sex? Tick ☑ one box only.

- ☐ Never
- ☑ Seldom
- ☑ Occasionally
- ☑ Often
- ☑ Always
- ☐ Don't know
- ☑ Not applicable, I did not have sex in last 3 months

503. In the <u>last 3 months</u>, did drinking alcohol prevent you from using condoms? Tick ☑ one box only.

- ☐ Yes
- ☑ No
- ☐ Don't know
- ☐ Not applicable, I did not have sex and/or did not drink alchohol in the last 3 months.

504. In the <u>last 3 months</u>, did drinking alcohol prevent you from using condoms correctly? Tick ☑ one box only.

- ☐ Yes
- ☑ No
- ☐ Don't know
- ☐ Not applicable, I did not have sex and/or did not drink alchohol in the last 3 months.

Section 6. Men's Section

601. Are you circumcised?

- ☐ Yes
- ☑ No
- ☐ Don't know

602. During the <u>last 12 months</u>, have you had an abnormal discharge from your penis or any ulcers/sores near your penis? Tick ☑ one box only.

- ☐ Yes
- ☑ No
- ☐ Don't know

You are finished completing the survey. Thank you!

Sexual Behavior Diary

Participant ID Number: _____

Botswana
Defence Force

SBD ___
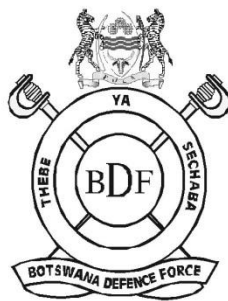
Instructions for Completing the Sexual Behavior Diary

To maintain your privacy, you are advised to keep this diary in a <u>secure location</u>, as you would keep your other personal belongings. You may keep this diary in a <u>secure location</u> at your work place. Please do not share or show this diary to others, including your sexual partners. We understand that this diary asks about sensitive information. Please try to answer as honestly as possible. Remember, your <u>answers will remain confidential</u>.

Please do not modify or change your sexual behaviors while participating in this study, as the purpose of this diary is to collect information on your typical sexual behaviors. You will complete this diary over a one week period. Please try to complete this diary <u>on a daily basis</u>. If you do not have access to the diary over the weekend, please complete the diary the following Monday when you return to work.

For each day, report sexual activity and condom use that occurred during a 24 hour period, starting at 6:00 AM to 5:59 AM the next day. We understand that you may not have sexual intercourse every day. If this is the case, tick the box that specifies that you did not have sexual intercourse that particular day. For each day, follow the steps below.

1. Using the calendar provided, write in the date for each day of this one week diary.

2. Question 2: Did you have sexual intercourse today?
   Sexual intercourse includes both vaginal and anal sex.
   - If you had sex today, tick the "Yes" box and proceed to question 3.
   - If you did not have sex, tick the "No" box. STOP. You are done filling out the diary for the day. Do not mark anything for this day.

3. Question 3: <u>If you did have sexual intercourse,</u> write in the number of times that you had sex on that particular day.

4. Question 4: <u>If you did have sexual intercourse,</u> regardless of whether you used a condom or not, did you have enough new, unused condoms available for each sexual act that you had today?

   The following examples below will help you answer this question:
   - Let's say you had sex 2 times today and you had a new, unused condom available during each sexual act. Regardless of whether you used a condom or not, you would tick the "Yes" box.
   - However, let's say you had sex 2 times today. For the first sexual act, you had one new, unused condom with you. However, for the second sexual act, you did not have any new, unused condoms available. Regardless of you whether you used a condom or not, you would tick the "No" box.

2

Starting on the next page, <u>if you did have sex,</u> you will now write down information about the sexual activity that you had during the 24 hour period, <u>up to 3 times</u> of sexual intercourse. For <u>each time you had sexual intercourse</u>, answer the following questions that follow.

5. What is the relationship of the sexual partner to you? <u>Tick one box only.</u> The following definitions are provided to help you better identify the type of partner you had sex with.

- **Spouse:** partner whom you are legally or traditionally married to.
- **Regular, cohabitating partner:** any person who is <u>currently, physically living with you in the same home</u> and with whom you have had sex with more than twice, or any person who is <u>currently physically living with you in the same home</u> and with whom the sexual relationship has lasted more than one year.
- **Regular, non-cohabitating partner:** any person who is <u>currently, NOT physically living with you in the same home</u> and with whom you have had sex with more than twice, or any person who is <u>currently, NOT physically living with you in the same home</u> and with whom the sexual relationship has lasted more than one year.
- **Casual partner:** partner with whom you have had sex with only 1 or 2 times.
  - If you had sex with a casual partner, specify whether you provided any material goods such as gifts, money, etc. for sex.

**If you had sex <u>two</u> times during a particular day, specify whether the partner you had sex with the second time is the same as the first partner or is a different partner.

***If you had sex <u>three</u> times during a particular day, specify whether the partner you had sex with the third time is the same as the first partner, second partner, or is a different partner.

6. Did you use a condom during this sexual encounter?
   - <u>If you did use a condom, please tick the "Yes" box and only answer the questions in that column. Do not tick any of the other items in the "No" column.</u> Provide the name of the condom you used and whether the condom was scented or not. Please, tick ALL the reasons why you used a condom.
   - <u>If you DID NOT use a condom, please tick the "No" box and only answer the questions in that column. Do not tick any of the other items in the "Yes" column.</u> Please tick ALL the reasons why you did not use a condom. If you had a condom with you and did not use it because you did not like it, provide the name of the condom you had with you.

3

The following calendars are provided to assist you in remembering the dates.

	September 2010					
Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

	October 2010					
Sun	Mon	Tue	Wed	Thu	Fri	Sat
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

4

	November 2010					
Sun	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

	December 2010					
Sun	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

Example Diary   **BDF XXXXXX**

The following example is provided to help you fill out this diary.

Example Scenario:
Suppose the date is May 18, 2010. You had sex twice today, with two different partners. For the first sexual intercourse, you had a new, unused condom available. For the second sexual intercourse, you also had a new, unused condom available.

The first sexual intercourse, you had sex with a casual partner at 8:30am. You did not exchange any material goods for sex with this casual partner. A condom was used. The name of the condom was "CAREX" and the condom was not scented. You used the condom because you wanted to protect yourself against sexually transmitted infections.

The second time you had sexual intercourse during the day, you had sex with a regular partner (your girlfriend) at 9:00 PM. Your girlfriend does not live with you in your home. This partner is a different partner than the first partner you had sex with in the morning. A condom was not used because you prefer sex without a condom and you did not like the condoms that you had with you. The name of the condom was "Blue and Gold".

Based on this example, you will fill out the diary as follows

1. What is the date today?
   Day: _1_ _8_
   Month: _0_ _5_
   Year: _2_ _0_ _1_ _0_

2. Did you have sexual intercourse today?
   Tick ☑ one box only.
   ☑ Yes. Proceed to Question 3.
   ☐ No. STOP. You are done filling out this diary for the day.

3. How many times did you have sexual intercourse today?

   __2__ (provide number)

4. Regardless of whether you used a condom or not, did you have enough new, unused condoms available for each sexual intercourse that you had today?
   ☑ Yes
   ☐ No

**If you had sexual intercourse today,
proceed to the next page.**

**Directions: Only record information for up to three times that you had
sexual intercourse today.**

6

Example Diary

BDF XXXXXX

Sexual Intercourse 1

5. The <u>first</u> time you had sexual intercourse today, what is the relationship of the sexual partner to you? Tick ☑ one box only.

☐ Spouse

☐ Regular, cohabitating partner

☐ Regular, non-cohabitating partner

☑ Casual partner

    If casual partner, did you exchange any material goods (gifts, money, etc) for sex?

      ☐ Yes

      ☑ No

---

6. Did you use a condom during this sexual act?
Tick ☑ <u>either YES or NO</u> and answer the questions that follow in that <u>one</u> box.

☑ YES, a condom was used	☐ NO, a condom was not used
6a1. What type of condom did you use? Name: CAREX	**6b. Why did you not use a condom?** Tick ☑ <u>all</u> that apply.
6a2. Was the condom scented (ex. strawberry, banana, etc.)? ☐ Yes ☑ No	☐ I prefer sex without a condom ☐ I did not have any condoms with me ☐ I trust this partner ☐ I was too drunk to use a condom ☐ I did not like any of the condoms that I had with me
6a3. Why did you use a condom? Tick ☑ <u>all</u> that apply. ☐ I like the condom wrapper ☐ I like the scent/smell of the condom ☑ I want to protect against sexually transmitted infections, such as HIV ☐ I want to prevent against pregnancy ☐ My partner wanted to use a condom ☐ Other:_____	Name of condom you had with you: _____ ☐ Other:_____ _____

If you only had sexual intercourse <u>one time</u> today, STOP here. If you sexual intercourse <u>two times</u> today, fill out the next section.

7

Example Diary   **BDF XXXXXX**

Sexual Intercourse 2	

7. The <u>second</u> time you had sexual intercourse today, what is the relationship of the sexual partner to you? Tick ☑ one box only.
☐ Spouse
☐ Regular, cohabitating partner
☑ Regular, non-cohabitating partner
☐ Casual partner
   If casual partner, did you exchange any material goods (gifts, money, etc) for sex?
    ☐ Yes
    ☐ No
	8. Who was this sexual partner? Tick ☑ one box only.
	☐ Same as partner 1
	☑ Different partner

9. Did you use a condom during this sexual act?
Tick ☑ either <u>YES</u> or <u>NO</u> and answer the questions that follow in that <u>one</u> box.

☐ **YES, a condom was used**	☑ **NO, a condom was not used**
9a1. What type of condom did you use? Name:_____	**9b. Why did you not use a condom?** Tick ☑ <u>all</u> that apply. ☑ I prefer sex without a condom ☐ I did not have any condoms with me ☐ I trust this partner ☐ I was too drunk to use a condom ☑ I did not like any of the condoms that I had with me Name of condom you had with you: BLUE & GOLD ☐ Other:_____ _____
9a2. Was the condom scented (ex. strawberry, banana, etc.)? ☐ Yes ☐ No	
9a3. Why did you use a condom? Tick ☑ <u>all</u> that apply. ☐ I like the condom wrapper ☐ I like the scent/smell of the condom ☐ I want to protect against sexually transmitted infections, such as HIV ☐ I want to prevent against pregnancy ☐ My partner wanted to use a condom ☐ Other:_____ _____	

If you only had sexual intercourse <u>two times</u> today, STOP here.
If you sexual intercourse <u>three times</u> today, fill out the next section.

11

8

Sexual Intercourse 3

10. The <u>third</u> time you had sexual intercourse today, what is the relationship of the sexual partner to you? Tick ☑ one box only.

- ☐ Spouse
- ☐ Regular, cohabiting partner
- ☐ Regular, non-cohabiting partner
- ☐ Casual partner
  If casual partner, did you exchange any material goods (gifts, money, etc) for sex?
  - ☐ Yes
  - ☐ No

11. Who was this sexual partner? Tick ☑ one box only.

- ☐ Same as partner 1
- ☐ Same as partner 2
- ☐ Different partner

12. Did you use a condom during this sexual act?
Tick ☑ either <u>YES or NO</u> and answer the questions that follow in that <u>one</u> box.

☐ **YES, a condom was used**

12a1. What type of condom did you use?
Name:_____

12a2. Was the condom scented (ex. strawberry, banana, etc.)?
- ☐ Yes
- ☐ No

12a3. Why did you use a condom?
Tick ☑ <u>all</u> that apply.
- ☐ I like the condom wrapper
- ☐ I like the scent/smell of the condom
- ☐ I want to protect against sexually transmitted infections, such as HIV
- ☐ I want to prevent against pregnancy
- ☐ My partner wanted to use a condom
- ☐ Other:_____
  _____

☐ **NO, a condom was not used**

12b. Why did you not use a condom?
Tick ☑ <u>all</u> that apply.
- ☐ I prefer sex without a condom
- ☐ I did not have any condoms with me
- ☐ I trust this partner
- ☐ I was too drunk to use a condom
- ☐ I did not like any of the condoms that I had with me

  Name of condom you had with you:
  _____

- ☐ Other:_____
  _____

STOP, you are done filling out the diary for this day.

9

This page marks the end of the example diary.

You may begin filling out this diary starting with Day 1.

Day 1

11

Day 1

1. What is the date today?
   Day: __ __
   Month:__ __
   Year: __ __ __ __

2. Did you have sexual intercourse today?
   Tick ☑ <u>one</u> box only.
   ☐   Yes. Proceed to Question 3.
   ☐   No. **STOP.** You are done filling out this diary for the day.

3. How <u>many times</u> did you have sexual intercourse today?

   _____ (provide number)

4. Regardless of whether you used a condom or not, did you have enough new, unused condoms available for each act of sexual intercourse that you had this day?
   ☐   Yes
   ☐   No

If you had sexual intercourse today,
proceed to the next page.

Directions: Only record information for up to <u>three</u>
times that you had sexual intercourse today.

12

Day 1

Sexual Intercourse 1

5. The first time you had sexual intercourse today, what is the relationship of the sexual partner to you? Tick ☑ one box only.

☐ Spouse

☐ Regular, cohabitating partner

☐ Regular, non-cohabitating partner

☐ Casual partner
   If casual partner, did you exchange any material goods (gifts, money, etc) for sex?

   ☐ Yes

   ☐ No

6. Did you use a condom during this sexual act?
Tick ☑ either YES or NO and answer the questions that follow in that one box.

☐ YES, a condom was used	☐ NO, a condom was not used
6a1. What type of condom did you use? Name:_____	**6b. Why did you not use a condom?** Tick ☑ all that apply.
6a2. Was this condom scented (ex. strawberry, banana, etc.)?	☐ I prefer sex without a condom
☐ Yes	☐ I did not have any condoms with me
☐ No	☐ I trust this partner
6a3. Why did you use this condom? Tick ☑ all that apply.	☐ I was too drunk to use a condom
☐ I like the condom wrapper	☐ I did not like any of the condoms that I had with me
☐ I like the scent/smell of the condom	Name of condom you had with you:
☐ I want to protect against sexually transmitted infections, such as HIV	_____
☐ I want to prevent against pregnancy	☐ Other:_____
☐ My partner wanted to use a condom	_____
☐ Other:_____	
_____	

If you only had sexual intercourse one time today, STOP here.
If you sexual intercourse two times today, fill out the next section.

Day 1

Sexual Intercourse 2	
7. The <u>second</u> time you had sexual intercourse today, what is the relationship of the sexual partner to you? Tick ☑ one box only. ☐ Spouse ☐ Regular, cohabitating partner ☐ Regular, non-cohabitating partner ☐ Casual partner If casual partner, did you exchange any material goods (gifts, money, etc) for sex? ☐ Yes ☐ No	**8. Who was this sexual partner?** Tick ☑ one box only. ☐ Same as partner 1 ☐ Different partner
9. Did you use a condom during this sexual act? Tick ☑ <u>either YES or NO</u> and answer the questions that follow in that <u>one</u> box.	
☐ **YES, a condom was used** **9a1. What type of condom did you use?** Name:_____ **9a2. Was this condom scented (ex. strawberry, banana, etc.)?** ☐ Yes ☐ No **9a3. Why did you use this condom?** Tick ☑ <u>all</u> that apply. ☐ I like the condom wrapper ☐ I like the scent/smell of the condom ☐ I want to protect against sexually transmitted infections, such as HIV ☐ I want to prevent against pregnancy ☐ My partner wanted to use a condom ☐ Other:_____ _____	☐ **NO, a condom was not used** **9b. Why did you not use a condom?** Tick ☑ <u>all</u> that apply. ☐ I prefer sex without a condom ☐ I did not have any condoms with me ☐ I trust this partner ☐ I was too drunk to use a condom ☐ I did not like any of the condoms that I had with me Name of condom you had with you: _____ ☐ Other:_____ _____
If you only had sexual intercourse <u>two times</u> today, STOP here. **If you sexual intercourse <u>three times</u> today, fill out the next section.**	

14

Day 1

Sexual Intercourse 3	
10. The <u>third</u> time you had sexual intercourse today, what is the relationship of the sexual partner to you? Tick ☑ **one box only.** ☐ Spouse ☐ Regular, cohabitating partner ☐ Regular, non-cohabitating partner ☐ Casual partner If casual partner, did you exchange any material goods (gifts, money, etc) for sex? ☐ Yes ☐ No	**11. Who was this sexual partner?** Tick ☑ **one box only.** ☐ Same as partner 1 ☐ Same as partner 2 ☐ Different partner
12. Did you use a condom during this sexual act? Tick ☑ <u>either YES or NO</u> and answer the questions that follow in that <u>one</u> box.	
☐ **YES, a condom was used** **12a1. What type of condom did you use?** Name:_____ **12a2. Was this condom scented (ex. strawberry, banana, etc.)?** ☐ Yes ☐ No **12a3. Why did you use this condom?** Tick ☑ <u>all</u> that apply. ☐ I like the condom wrapper ☐ I like the scent/smell of the condom ☐ I want to protect against sexually transmitted infections, such as HIV ☐ I want to prevent against pregnancy ☐ My partner wanted to use a condom ☐ Other:_____ _____	☐ **NO, a condom was not used** **12b. Why did you not use a condom?** Tick ☑ <u>all</u> that apply. ☐ I prefer sex without a condom ☐ I did not have any condoms with me ☐ I trust this partner ☐ I was too drunk to use a condom ☐ I did not like any of the condoms that I had with me Name of condom you had with you: _____ ☐ Other:_____ _____
STOP, you are done filling out the diary for this day.	

15

Note: Only questions from Day 1 of the sexual behavior diary are provided in the

Appendix. These same questions are asked of participants for Days 2–7.

This is the end of your one week diary.
Please return this diary to:
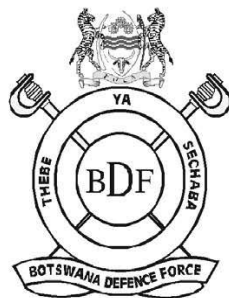
Site Coordinator Name: _____

Mobile number: _____

Return by this date: ____/____/_____

Thank You!

Retrospective Follow-Up Survey

2010 Botswana Defence Force
Sexual Behavior Risk Questionnaire

2010 Botswana Defence Force Sexual Behavior Risk Questionnaire Follow-Up

Today's Date: Day: __ __
                   Month: __ __
                   Year: __ __ __ __

Instructions:

As the survey administrator reads the questions out loud, please follow along with this survey and tick one box next to the appropriate answer or write in your answer in the space provided. <u>For each question, tick one box only, unless it is specified that you should tick more than one box that best applies to you.</u>

Please remember that your answers to this survey are completely confidential so please answer each question as honestly as possible. If you have any questions or problems, please raise your hand and a staff member will come over to assist you.

Section 1. Sexual Activity

The next questions ask about the sexual activity that was recorded in <u>your third and fourth</u> <u>sexual behavior diaries during the last two weeks.</u> These diaries were most recently returned to the study site coordinator. <u>Please refer to this SAME time period when answering the questions</u> <u>below.</u>

101. In the <u>last two weeks,</u> on how many days did you have sexual intercourse? If you did not have sexual intercourse in the last two weeks, write 0.

_____ days

102. In the <u>last two weeks</u>, how many different people have you had sex with? If you did not have sexual intercourse in the last two weeks, write 0.

_____ different people

103. With what types of partners did you have sexual intercourse with in the <u>last two weeks</u>? The following definitions are provided to help you better identify the type of partner you had sex with.

1. **Spouse:** partner whom you are legally or traditionally married to.
2. **Regular, cohabitating partner**: any person who is currently, physically living with you in the same home and with whom you have had sex with more than twice, or any person who is currently physically living with you in the same home and with whom the sexual relationship has lasted more than one year.
3. **Regular, non-cohabitating partner:** any person who is currently, NOT physically living with you in the same home and with whom you have had sex with more than twice, or any person who is currently, NOT physically living with you in the same home and with whom the sexual relationship has lasted more than one year.
4. **Casual partner:** partner with whom you have had sex with only 1 or 2 times.

Tick ☑ <u>all</u> boxes that apply

☐ Spouse
☐ Regular, cohabitating partner
☐ Regular, non-cohabitating partner
☐ Casual partner
☐ Not applicable, I did not have sexual intercourse in the last two weeks

104. If you are married (tradition or legal), how many times did you have sexual intercourse with your spouse in the <u>last two weeks</u>? If you did not have sexual intercourse with your spouse in the last two weeks, write 0.

_____ (provide number)

☐ Not applicable, I do not have a spouse

Page 3 of 7

105. In the last two weeks, how many times did you use a condom during sexual intercourse with your spouse? If you did not use a condom during sexual intercourse with your spouse in the last two weeks, write 0.

_____ (provide number)

☐ Not applicable, I do not have a spouse

106. If you have regular cohabitating partners, approximately how many times did you have sexual intercourse with your regular cohabitating partners in the last two weeks? If you did not have sexual intercourse with your regular cohabitating partners in the last two weeks, write 0.

_____ (provide number)

☐ Not applicable, I do not have regular cohabitating partners

107. In the last two weeks, approximately how many times did you use a condom during sexual intercourse with your regular cohabitating partners? If you did not use a condom during sexual intercourse with your regular cohabitating partners in the last two weeks, write 0.

_____ (provide number)

☐ Not applicable, I do not have regular cohabitating partners

108. If you have regular non-cohabitating partners, approximately how many times did you have sexual intercourse with your regular non-cohabitating partners in the last two weeks? If you did not have sexual intercourse with your regular non-cohabitating partners in the last two weeks, write 0.

_____ (provide number)

☐ Not applicable, I do not have regular non-cohabitating partners

109. In the last two weeks, approximately how many times did you use a condom during sexual intercourse with your regular non-cohabitating partners? If you did not use a condom during sexual intercourse with your regular non-cohabitating partners in the last two weeks, write 0.

_____ (provide number)

☐ Not applicable, I do not have regular non-cohabitating partners

110. If you have <u>casual partners</u>, approximately how many times did you have sexual intercourse with your casual partners in the <u>last two weeks</u>? If you did not have sexual intercourse with casual partners in the last two weeks, write 0.

_____ (provide number)

☐ Not applicable, I do not have casual partners

111. In the <u>last two weeks</u>, approximately how many times did you use a condom during sexual intercourse with your <u>casual partners</u> in the <u>last two weeks</u>? If you did not use a condom during sexual intercourse with your casual partner in the last two weeks, write 0.

_____ (provide number)

☐ Not applicable, I do not have casual partners

112. If you had sexual intercourse with casual partners in the <u>last two weeks</u>, did you exchange any material goods (gifts, money, etc) for sexual intercourse with any of the casual partners? Tick ☑ one box only.

☐ Yes
☐ No
☐ Not applicable, I did not have sexual intercourse with any casual partners in last two weeks

113. Approximately how often did you use a condom during sexual intercourse in the <u>last two weeks</u>? Tick ☑ one box only.

☐ Always
☐ Most times
☐ Occasionally
☐ Never
☐ Not applicable, I did not have sexual intercourse in the last two weeks

114. With which type of partner did you <u>most frequently</u> use condoms during sexual intercourse in the <u>last two weeks?</u> Tick ☑ one box only.

☐ Spouse
☐ Regular, cohabitating partner
☐ Regular, non-cohabitating partner
☐ Casual partner
☐ Not applicable, I did not have sex in the last two weeks
☐ Not applicable, I did not use any condoms during sex in the last two weeks

Page 5 of 7

115. In the <u>last two weeks</u>, with which type of partner did you last have sex with?
Tick ☑ one box only.

☐ Spouse
☐ Regular, cohabitating partner
☐ Regular, non-cohabitating partner
☐ Casual partner
☐ Not applicable, I did not have sex in the last two weeks

116. The very <u>last time that you had sexual intercourse</u> in the <u>last two weeks</u>, did you use a condom? Tick ☑ one box only.

☐ Yes
☐ No
☐ Not applicable, I did not have sexual intercourse in the last two weeks

Section 2. Condoms and Access to Condoms

201. Did you have an adequate supply of condoms for your own use while enrolled in this study? Tick ☑ one box only.

☐ Yes
☐ No

202. Where were you able to get <u>FREE</u> condoms from within your Garrison during the study? Tick ☑ <u>all</u> boxes that apply.

☐1 Study coordinator   ☐6 Barracks
☐2 Condom dispenser   ☐7 Friend or acquaintance
☐3 Peer Educator   ☐8 Others (specify)_____
☐4 HIV/AIDS focal person   ☐9 Unit does not provide free condoms
☐5 Hospital   ☐ Don't know

203. If you do not use condoms, what are the reasons you do not use them? Please tick ☑ <u>all</u> boxes that apply.

☐ Condoms make sex less enjoyable   ☐9 My partner(s) doesn't want me to use one
☐2 Condoms break easily   ☐10 I am allergic to condoms
☐3 Condoms smell bad   ☐11 Condoms are against my religion
☐4 Condoms don't fit properly   ☐12 Difficult disposal after use
    (too small/too short/too large, etc.)   ☐ I want my partner to become pregnant
☐ I trust my partner(s)   ☐15 Other (specify) _____
☐ Condoms dampen the mood   ☐ Don't know
☐ Condoms are too expensive   ☐ Not applicable, I don't mind using condoms
☐8 I don't have the right brand   ☐99 Not applicable, I have never used a condom

Page 6 of 7

204.   Would you use a condom more often if it was scented?
        Tick ☑ one box only.

        ☐ Yes
        ☑ No

You are finished completing the survey.
Thank you for your participation!