



# *An Intervention Study Examining the Effects of Condom Wrapper Graphics and Scent on Condom Use in the Botswana Defence Force*

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## Report Documentation Page

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| 14. ABSTRACT<br><b>A non-randomized intervention study was implemented to evaluate the effects of condom scent and wrapper graphics on condom use in the Botswana Defence Force (BDF). From October 2010 to April 2011, four sites participated. Two hundred eleven sexually active male soldiers, aged 18-30 years, completed a survey collecting demographics and sexual and condom use behaviors. Following the baseline period, intervention condoms were distributed for 1 month: two sites received either scented or unscented condoms in a blue wrapper, while the other two received the same condoms in a camouflaged wrapper. Sexual activity was measured pre- and post-intervention for 2 weeks using behavior diaries. A condom use rate (CUR; frequency of protected sex divided by total frequency of sex) was computed for each participant. Mean CURs were 85.7% at baseline and 94.5% post-intervention; the 8.8% increase was significant. A significant wrapper-by-time interaction provided evidence of a differential increase in CURs between the wrapper groups. Adjusted odds of condom use from baseline to post-intervention were higher for those receiving camouflaged wrappers compared with blue wrappers (odds ratio [OR] = 2.33; 95% confidence interval [CI]: 1.05-5.16). Adjusted odds of condom use were higher for those reporting using scented versus unscented condoms (OR = 1.96; 95% CI: 1.18-3.24).</b> |                                    |  |                                  |
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## An intervention study examining the effects of condom wrapper graphics and scent on condom use in the Botswana Defence Force

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Free condoms provided by the government are often not used by Botswana Defence Force (BDF) personnel due to a perceived unpleasant scent and unattractive wrapper. Formative work with the BDF found that scented condoms and military-inspired (camouflage) wrapper graphics were appealing to personnel. A non-randomized intervention study was implemented to determine whether condom wrapper graphics and scent improved condom use in the BDF. Four military sites were selected for participation. Two sites in the south received the intervention condom wrapped in a generic wrapper and two sites in the north received the intervention condom wrapped in a military-inspired wrapper; intervention condoms were either scented or unscented. Two hundred and eleven male soldiers who ever had sex, aged 18–30 years, and stationed at one of the selected sites consented to participate. Sexual activity and condom use were measured pre- and post-intervention using sexual behavior diaries. A condom use rate (CUR; frequency of protected sex divided by the total frequency of sex) was computed for each participant. Mean CURs significantly increased over time (85.7% baseline vs. 94.5% post-intervention). Adjusted odds of condom use over time were higher among participants who received the intervention condom packaged in the military wrapper compared with the generic wrapper. Adjusted odds of condom use were also higher for participants who reported using scented vs. unscented condoms. Providing scented condoms and condoms packaged in a military-inspired wrapper may help increase condom use and reduce HIV infection among military personnel.

**Keywords:** HIV; sexual behaviors; condom use; military; HIV prevention intervention

### Introduction

Military personnel are at increased risk for human immunodeficiency virus (HIV) and other sexually transmitted infections (STIs) (Miller & Yeager, 1995). Studies have reported risky behaviors in military personnel including unprotected sex with female sex workers (Nwokoji & Ajuwon, 2004), multiple sexual partners (Anastario et al., 2011), and alcohol abuse (Cheng et al., 2012). Additionally, while correct and consistent condom use is highly effective against HIV (Pinkerton & Abramson, 1997), the use among soldiers is lower than ideal (Bing et al., 2008).

One component of the Botswana Defence Force (BDF) HIV prevention program is the promotion and distribution of condoms to service members at military clinics and condom dispensers. However, anecdotal evidence suggests that the government-issued condoms are often not used due to a perceived unpleasant scent and unappealing wrapper. Formative work with the BDF found that scented condoms and military-inspired (camouflage) wrapper graphics were appealing to personnel.

Qualitative data show that a condom's scent may affect use (MacPhail, 2003); however, quantitative studies examining the effects of a condom's scent and the wrapper's appearance are lacking. This paper presents findings from a non-randomized intervention study that examined the effects of condom wrapper graphics and scent in increasing condom use among BDF personnel. Three questions were addressed: (1) Will the intervention condom increase overall usage rates? (2) Will usage rates differ among those receiving the intervention condom packaged in a customized military wrapper compared with those receiving the condom in a generic wrapper? (3) Will usage rates differ among participants who reported using scented vs. unscented condoms?

### Methods

#### Study design

From October 2010 to April 2011, an intervention study was implemented among four BDF sites that were similar in size, military unit composition, and urban or

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rural location. Two sites in the south (S1, S2) and two in the north (N1, N2) were included. The study included a baseline survey, four weekly sexual behavior diaries, a post-intervention survey, and post-intervention focus groups. Results from the baseline and post-intervention surveys are previously reported (Tran, Thomas, Ditsela, et al., 2013; Tran, Thomas, Vaida, et al., 2013).

### Study participants

Participants were male BDF personnel who ever had sex, aged 18–30 years, and stationed at one of the selected sites. Recruitment activities began one month prior to enrollment and were conducted by BDF study personnel with flyers and standard military communication. Interested personnel voluntarily attended a briefing where the study purpose and procedures were explained. BDF study personnel stressed that participation was completely voluntary and could be stopped at any time. Those interested in participating met privately with BDF study personnel to have their questions/concerns addressed before providing written informed consent. Two hundred and eleven men (81.2%) of a target sample size of 260

consented. This study was approved by the following institutional review boards: Naval Health Research Center (USA), San Diego State University (USA), and Ministry of Health (Botswana).

### Baseline and intervention condoms

Baseline condoms consisted of government-issued condoms (Lorato® or Carex®) or other brands used by participants. The intervention condom was manufactured by Thai Nippon Rubber Industry (Thailand), and selected by the BDF because members perceived it to be of a “higher quality” than the government-issued condoms. The intervention condom was packaged in either a generic or customized military wrapper (Figure 1), and available as scented (e.g., vanilla) or unscented. Sites S1 and S2 received condoms packaged in the generic wrapper; “Condom” was printed on one side and “Protect Yourself” was printed on the other. Sites N1 and N2 received condoms packaged in a customized BDF military wrapper; “Protect Yourself” and “SEKWATA go ya go ileng” (“Sex Education Knowledge with AIDS Testing Awareness until the end of time”) were printed



Figure 1. An intervention study examining the effects of condom wrapper graphics and scent on condom use in the Botswana Defence Force: condom wrapper designs.

on the wrapper. This phrase, developed by the BDF in 2009 to reduce HIV risk in members, has been used as an integral component of the BDF HIV prevention program. Sites S1 and N1 received the unscented condom and S2 and N2 received the scented condom. Due to the small number of sites and to reduce contamination of the intervention, randomization was not used to allocate the wrapper nor scent.

**Study procedures**

Figure 2 summarizes the study procedures and participation by site. Consented participants provided their contact information, completed a self-administered demographic and HIV risk behavior survey, and attended a training session on how to complete a weekly sexual behavior diary. The diary provided a template for recording up to three sexual encounters that occurred during a single day. Participants were asked to complete the diary daily and indicate whether or not they had sex (vaginal or anal intercourse), the type of partner (spouse, regular cohabitating, regular non-cohabitating, or casual partner) whom they had sex with during each encounter,

and whether a condom was used during each encounter. Four diaries were distributed during the study; Diary 1 was distributed at the end of the initial training session.

At follow-up visit 1, participants returned Diary 1 and received Diary 2. A week later, participants returned Diary 2 and were given 30 intervention condoms according to their site. Intervention condoms were also available through condom dispensers and clinics. The intervention period lasted for one month. Two weeks into this period (follow-up visit 3), participants received refresher training on completing the diary. At this visit, Diary 3 and more condoms were distributed. A week later, participants returned Diary 3 and received more condoms and Diary 4. At the final visit, participants returned Diary 4 and completed a self-administered follow-up survey.

**Outcome measures**

A condom use rate (CUR) percentage was defined as the frequency of using a condom divided by the total frequency of sex (over the course of two weeks), and calculated for each participant. Baseline CURs were computed using data

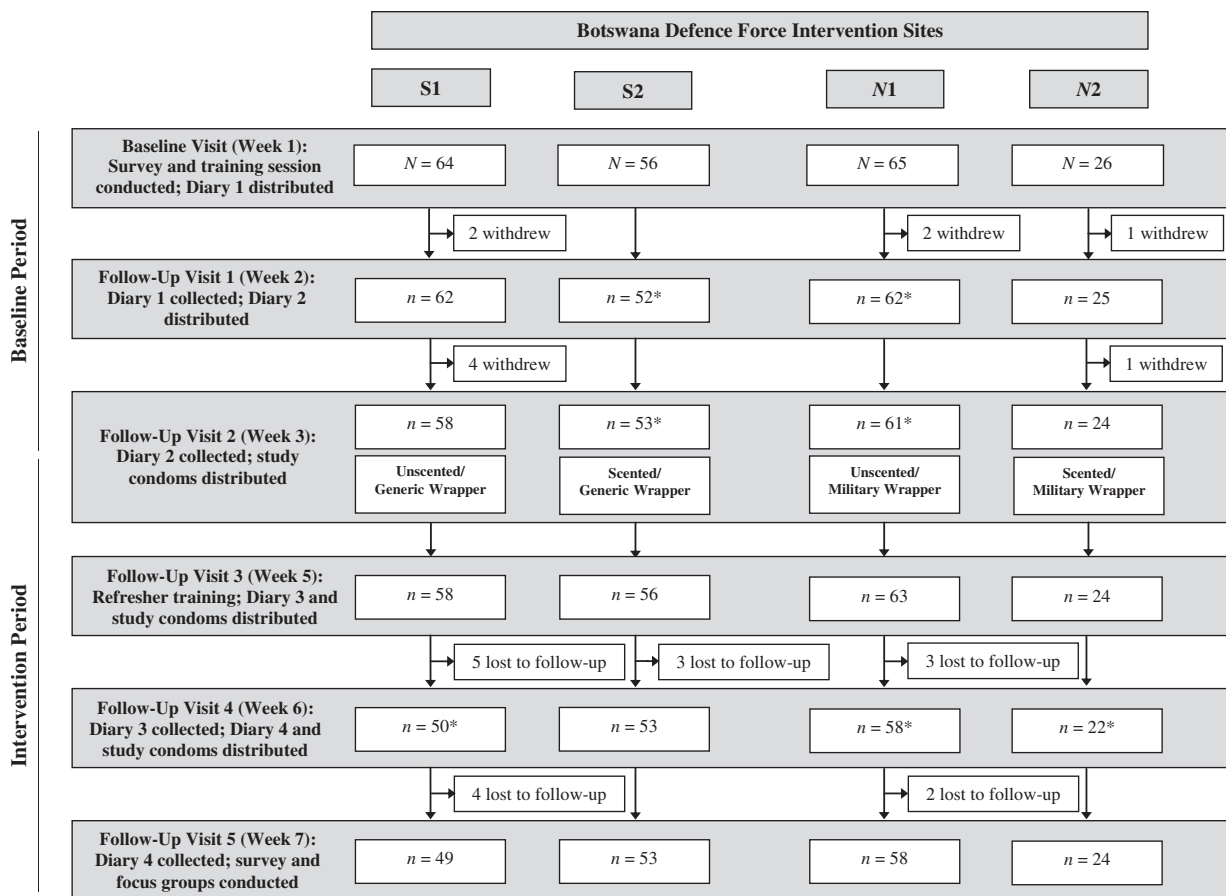


Figure 2. An intervention study examining the effects of condom wrapper graphics and scent on condom use in the Botswana Defence Force: procedures and participation by site. \*Some participants did not attend this visit, but attended subsequent visits.

from Diaries 1 and 2 and post-intervention CURs were computed using data from Diaries 3 and 4.

### Statistical analysis

Comparisons of baseline CURs, demographics, and HIV risk behaviors by the two intervention groups were conducted using Pearson's chi-square or Fisher's exact tests for categorical variables and two sample *t*-tests or Wilcoxon rank-sum tests for continuous variables.

Participants were excluded from the analysis if they did not provide any diary data ( $n = 23$ ) or had no sexual activity ( $n = 33$ ). Due to longitudinal data collection, not all participants had two weeks of baseline and post-intervention measurements. Separate analyses were conducted for 155 participants with varying follow-up time (i.e., one or two weeks) for their baseline and post-intervention measurements, and for 135 participants who had two weeks of both baseline and post-intervention measurements.

The Wilcoxon signed-rank test was used to evaluate the overall intervention effect on CURs over time. The Wilcoxon rank-sum test was used to compare the change in CURs from baseline to post-intervention between the two wrapper groups. The overall intervention and wrapper effects were further evaluated using mixed-effects logistic regression (MELR). In MELR, the CUR at each time point and for each subject is assumed to follow a binomial rate distribution. The log-odds of condom use for each sex act are a function of the time point, 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. Since the baseline CUR is not related to the intervention (wrapper type), the overall effect of the intervention is given by the time effect (post-intervention vs. baseline). The differential effect of the two wrapper types on CURs translates into an interaction effect between the wrapper type and time (i.e., different slopes for the two groups). Four MELR models were considered: (1) Model 1 only included time to evaluate the overall intervention effect; (2) Model 2 included time, wrapper type, and their interaction to evaluate the wrapper effect; (3) Model 3 expanded on Model 2 to evaluate the effect of the condom's scent, adjusting for sexual partner types and characteristics that differed by the wrapper groups. Although sites received either the scented or unscented condoms, participants had access to both types from other sources throughout the study. Condom scent was therefore treated as a time-varying independent variable; (4) Model 4 expanded on Model 3 by including marital status-by-time and education-by-time interactions. These characteristics were evaluated as possible factors explaining the intervention effect, since literature has shown both to be associated with condom

use (Kapiga & Lugalla, 2003; Mnyika, Klepp, Kvale, & Ole-Kingori, 1997). Non-significant interaction terms were removed from the model.

Analyses were two-tailed ( $\alpha = 0.05$ ) and performed using SAS version 9.3 (SAS Institute Inc., Cary, North Carolina, USA).

### Results

Baseline CURs and characteristics by wrapper group were compared (Table 1). Participants assigned the generic wrappers were more likely to be single (89.2% vs. 72.5%;  $p = 0.002$ ), to have completed tertiary/vocational school (34.2% vs. 13.2%;  $p < 0.001$ ), from the Support unit (37.0% vs. 17.6%;  $p < 0.001$ ), and to report a higher median number of casual partners (three vs. two partners;  $p = 0.033$ ). Baseline CURs did not differ significantly by wrapper group (Mean<sub>Generic</sub> = 88.2% vs. Mean<sub>Military</sub> = 82.6%;  $p = 0.27$ ).

The change in CURs over time was compared for all participants and subsequently stratified by wrapper type. The mean CUR of the study population was 85.7% at baseline and increased to 94.5% post-intervention; the 8.8% change was statistically significant ( $Z = 4.2$ ;  $p < 0.001$ ). The mean change in CUR ( $\Delta$ CUR) was also higher in the military wrapper group (Mean  $\Delta$ CUR = 12.1%, SD = 29.0) vs. the generic wrapper group (Mean  $\Delta$ CUR = 6.2%, SD = 24.2). The observed difference was marginally significant ( $p = 0.057$ ).

CURs increased over time among the overall study sample as shown in the MELR models (Table 2). As observed in Model 1, the odds of condom use were 3.5 times higher post-intervention when compared with baseline (odds ratio [OR] = 3.48; 95% confidence interval [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 groups. The odds of condom use post-intervention compared with baseline were almost seven times higher among participants receiving condoms packaged in military wrappers (OR<sub>Military</sub> = 6.65; 95% CI: 3.79–11.65). This OR was approximately two times higher among those who received generic wrapped condoms (OR<sub>Generic</sub> = 2.13; 95% CI: 1.35–3.36). Thus, the OR is over three times higher for the military wrapper group compared with the generic wrapper group (OR<sub>Military</sub>/OR<sub>Generic</sub> = 3.12; 95% CI: 1.51–6.43). The wrapper-by-time interaction remained significant, even after adjustment for condom scent and other covariates (Table 2, Model 3), and in the presence of the education-by-time interaction (Table 2, Model 4); however, associations were attenuated.

Condom scent was significantly associated with the odds of condom use (Table 2, Model 3). After adjustment for the wrapper type and other covariates, the odds

Table 1. Comparisons of baseline condom use rates and other characteristics by intervention group ( $N = 211$ ).

|   | Intervention                  |        |                               |          | <i>p</i> value |
|---|-------------------------------|--------|-------------------------------|----------|----------------|
|   | Generic wrapper ( $n = 120$ ) |        | Military wrapper ( $n = 91$ ) |          |                |
| Age in years, mean (SD)                                 | 24.9                          | 2.3    | 25.5                          | 2.4      | 0.08           |
| Marital status, $n$ (%)                                 |                               |        |                               |          | 0.002          |
| Single, never married                                   | 107                           | 89.2   | 66                            | 72.5     |                |
| Married/cohabitating                                    | 13                            | 10.8   | 25                            | 27.5     |                |
| Education, $n$ (%)                                      |                               |        |                               |          | < 0.001        |
| Junior/senior secondary                                 | 79                            | 65.8   | 79                            | 86.8     |                |
| Tertiary/vocational                                     | 41                            | 34.2   | 12                            | 13.2     |                |
| Religion, $n$ (%)                                       |                               |        |                               |          | 0.28           |
| Christian   | 96                            | 80.0   | 78                            | 85.7     |                |
| Other   | 24                            | 20.0   | 13                            | 14.3     |                |
| Military rank, $n$ (%)                                  |                               |        |                               |          | 0.29           |
| Private   | 67                            | 55.8   | 41                            | 45.1     |                |
| Junior NCO  | 47                            | 39.2   | 45                            | 49.5     |                |
| Junior officer  | 6                             | 5.0    | 5                             | 5.5      |                |
| Military unit, <sup>a</sup> $n$ (%)                     |                               |        |                               |          | < 0.001        |
| Fighting  | 29                            | 24.4   | 47                            | 51.7     |                |
| Logistics   | 45                            | 37.8   | 28                            | 30.8     |                |
| Support   | 44                            | 37.0   | 16                            | 17.6     |                |
| Trainers  | 1                             | 0.8    | 0                             | 0        |                |
| Military service in years, median (range)               | 3.0                           | 1–9    | 4.0                           | 1–13     | 0.074          |
| Baseline condom use rate (%), mean (SD)                 | 88.2                          | 23.2   | 82.6                          | 30.0     | 0.27           |
| Frequency of condom use, $n$ (%)                        |                               |        |                               |          | 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     |                |
| Number of lifetime partners, median (range)             | 11.0                          | 2–200  | 10.0                          | 1–200    | 0.16           |
| Number of regular partners, <sup>b</sup> median (range) | 2.0                           | 0–25   | 3.0                           | 0–35     | 0.83           |
| Number of casual partners, <sup>b</sup> median (range)  | 3.0                           | 0–45   | 2.0                           | 1–115    | 0.033          |
| Alcohol use, $n$ (%)                                    |                               |        |                               |          | 0.12           |
| Non/mild drinker (AUDIT score < 8)                      | 43                            | 36.4   | 42                            | 47.2     |                |
| Problem drinker (AUDIT score > 8)                       | 75                            | 63.6   | 47                            | 52.8     |                |
| HIV knowledge score (%), median (range)                 | 87.5                          | 50–100 | 87.5                          | 37.5–100 | 0.57           |

Notes: AUDIT, alcohol use disorders identification test; NCO, non-commissioned officer; SD, standard deviation.

<sup>a</sup>Excludes one participant with a missing response.

<sup>b</sup>Reported number of partners in the 12 months preceding the survey.

of condom use were over two times higher among participants who reported using scented vs. unscented condoms (OR = 2.28; 95% CI: 1.40–3.71). This association remained significant in the presence of the education-by-time interaction (Table 2, Model 4).

CURs over time differed significantly by educational status ( $p = 0.030$ ) (Table 2, Model 4). Although CURs increased over time for both education groups (Less educated [i.e., completed junior/secondary school]: CUR<sub>Baseline</sub> = 84.0%, CUR<sub>Post-intervention</sub> = 95.3% vs. More educated [i.e., completed tertiary/vocational school]: CUR<sub>Baseline</sub> = 90.3% and CUR<sub>Post-intervention</sub> = 92.6%), the change was more substantial for less educated participants. The odds of condom use were almost five times higher post-intervention compared with baseline for less educated participants (OR<sub>LessEducated</sub> =

4.59; 95% CI: 2.95–7.15). In contrast, condom use by time did not differ significantly for more educated participants, (OR<sub>MoreEducated</sub> = 1.76; 95% CI: 0.85–3.62). Thus, the OR is almost three times higher among less educated participants compared with more educated participants (OR<sub>LessEducated</sub>/OR<sub>MoreEducated</sub> = 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 of baseline and post-intervention measurements (data not shown).

## Discussion

This study demonstrates that CURs significantly increased after introducing the intervention condom.

Table 2. Generalized linear mixed regressions modeling the odds of condom use by time, wrapper, scent, and other covariates ( $N = 155$ ).

|  | OR of using a condom |                |                                  |                |                                  |                |                                  |                |
|--|----------------------|----------------|----------------------------------|----------------|----------------------------------|----------------|----------------------------------|----------------|
|  | Model 1              |                | Model 2                          |                | Model 3                          |                | Model 4                          |                |
|  | OR<br>(95% CI)       | <i>p</i> value | OR<br>(95% CI)                   | <i>p</i> value | OR<br>(95% CI)                   | <i>p</i> value | OR<br>(95% CI)                   | <i>p</i> value |
| Post vs. baseline  | 3.48<br>(2.46–4.92)  | < 0.001        |                                  |                |                                  |                |                                  |                |
| Military wrapper:<br>post vs. baseline   |                      |                | 6.65<br>(3.79–11.65)             | < 0.001        | 6.41<br>(3.62–11.34)             | < 0.001        | 4.33<br>(2.24–8.41)              | < 0.001        |
| Generic wrapper:<br>post vs. baseline  |                      |                | 2.13<br>(1.35–3.36)              | 0.001          | 1.98<br>(1.25–3.13)              | 0.004          | 1.86<br>(1.16–2.98)              | 0.010          |
| Wrapper-by-time<br>interaction   |                      |                | 3.12 <sup>c</sup><br>(1.51–6.43) | 0.002          | 3.24 <sup>c</sup><br>(1.56–6.76) | 0.002          | 2.33 <sup>c</sup><br>(1.05–5.16) | 0.038          |
| Scented vs.<br>unscented<br>condoms  |                      |                |                                  |                | 2.28<br>(1.40–3.71)              | 0.001          | 1.96<br>(1.18–3.24)              | 0.009          |
| Single vs. married/<br>cohabitating  |                      |                |                                  |                | 2.84<br>(1.16–6.96)              | 0.022          | 2.88<br>(1.18–7.02)              | 0.020          |
| Less vs. more<br>educated  |                      |                |                                  |                | 1.07<br>(0.45–2.58)              | 0.87           |                                  |                |
| Less educated: post<br>vs. baseline  |                      |                |                                  |                |                                  |                | 4.59<br>(2.95–7.15)              | < 0.001        |
| More educated: post<br>vs. baseline  |                      |                |                                  |                |                                  |                | 1.76<br>(0.85–3.62)              | 0.12           |
| Education-by-time<br>interaction   |                      |                |                                  |                |                                  |                | 2.61 <sup>d</sup><br>(1.10–6.19) | 0.030          |
| Fighting unit vs.<br>others  |                      |                |                                  |                | 1.09<br>(0.49–2.43)              | 0.83           | 1.08<br>(0.49–2.40)              | 0.85           |
| Regular vs. other<br>partners <sup>a</sup>   |                      |                |                                  |                | 1.36<br>(0.63–2.97)              | 0.43           | 1.36<br>(0.63–2.95)              | 0.43           |
| Used Lorato®/<br>Carex® only <sup>b</sup> vs.<br>other condom/<br>unspecified brands |                      |                |                                  |                | 2.00<br>(0.79–5.07)              | 0.14           | 1.83<br>(0.73–4.62)              | 0.20           |

Notes: CI, confidence interval; OR, odds ratio.

<sup>a</sup>Other partners were defined as casual partners only or both a casual and a regular partner.

<sup>b</sup>Lorato® and Carex® were the brands of government-issued condoms distributed freely by the Botswana Defence Force at baseline. Other condom brands purchased and used by participants included Choice, Contempo, Dr. Longs, Durex, Endurance, Lovers Plus, Mates, Monate Black, Moods, Rocky, Rough Rider, Smile, and Viva.

<sup>c</sup>This OR refers to the ratio of the ORs between the two intervention groups (military vs. generic wrapper).

<sup>d</sup>This OR refers to the ratio of the ORs between the two education groups (less vs. more educated).

The success of the intervention may be explained by the use of condom social marketing techniques, as shown in other studies (Agha, Karlyn, & Meekers, 2001; Cohen et al., 1999; Plautz & Meekers, 2007; Van Rossem & Meekers, 2007). The involvement of the BDF in the condom selection, conceptualization, and design of the military wrapper was essential in creating a product with the potential to impact condom use among its members. The increase in CURs over time could also be attributed to the distribution of condoms to participants, which may have helped promote condom awareness and use, as

reported in other studies (Burke et al., 2011; Cohen et al., 1999). However, the increase in condom use over time may not be fully attributable to the intervention, since a control group (i.e., participants who did not receive an intervention) was not included.

Results suggest that while CURs increased over time for both wrapper groups, the change was more substantial among the military wrapper group, suggesting that wrapper graphics may influence usage. One explanation why the military wrapper had a larger impact is because the design is linked to the military environment and is



exclusive to that profession. The camouflage pattern may also have boosted the soldiers' confidence in using condoms and restored feelings of masculinity when proposing condom use to their sexual partner. Previous studies have found that condoms are typically viewed as unnatural (Meyer-Weitz, Reddy, Weijts, van den Borne, & Kok, 1998) and un-masculine (Abdool Karim, Abdool Karim, Preston-Whyte, & Sankar, 1992; MacPhail & Campbell, 2001). The observed effect could also be explained by the use of the phrase "SEKWATA, go ya go ileng" on the military wrapper; because this phrase was written in the local language, it may have stirred feelings of familiarity and encouraged use. Additionally, since this phrase was integral to the BDF HIV prevention campaign, the results may be a by-product of the program's effectiveness.

CURs were also higher among participants who reported using scented condoms, supporting anecdotal, baseline data (Tran, Thomas, Ditsela, et al., 2013), and qualitative studies (MacPhail, 2003) that scent may affect usage. CURs also increased at a significantly steeper slope over time among less educated participants, suggesting the intervention had a larger influence on condom use in this group. This observation may be explained by the wrapper design. The wrapper graphics may have had a lower impact on the more educated participants, since they may have already been aware that condom use protects against HIV and were most likely using condoms more frequently, as observed in the high baseline CURs, and as reported in other studies (Kapiga & Lugalla, 2003; Lagarde et al., 2001; Westercamp et al., 2010). However, less educated participants may have been more influenced by the wrapper graphics, which included fundamental HIV prevention messages. Another possible explanation involves the method in which data were collected. All participants were asked to record their sexual and condom use behaviors in a diary. Less educated participants may have become more aware of their sexual and condom use behaviors by recording them, and as a result may have changed their behaviors over time. While it was previously shown that consistent condom use among BDF personnel (measured from the baseline survey) was relatively low (Tran, Thomas, Ditsela, et al., 2013), baseline CURs for this study (measured from the diary) were much higher, suggesting that the diary may have impacted condom use behaviors. Other studies have reported the positive effects of self-monitoring one's behaviors (Johnson & Wardle, 2011; Miller, Gutschall, & Holloman, 2009; Mockus et al., 2011).

There are limitations to this study. Due to the quasi-experimental study design (i.e., lack of intervention randomization), baseline differences between the two intervention groups were observed; however, these

differences were accounted for in the statistical analysis. Due to high mobility, most participants were only followed for one month after the intervention was introduced. Even though a significant increase in CURs was observed over that interval, a study with longer follow-up time is needed to examine longer-term intervention effects. 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 strict participant eligibility criteria, results may only be generalizable to BDF members of comparable age and behavior. Although not all BDF sites were included in the study, the four selected for participation contained the largest number of diverse BDF personnel. Respondent bias was plausible due to self-reported behaviors. We attempted to minimize this by ensuring privacy during survey administration and avoiding personal identifiers in the diaries.

There were several strengths to this innovative and novel study. To reduce recall bias, sexual behaviors and condom use were measured prospectively using a diary. While participants may not have completed the diary daily, they would only have had to recall events that occurred, at most, up to a week ago since diaries were collected weekly. These weekly collections may have helped attain the high study retention rate (87.2%) through consistent interaction with study personnel.

These findings suggest a direction for future research in condom procurement and social marketing among military personnel. Additional studies may help determine whether generic military condom wrappers or customized military condom wrappers are important in encouraging use among service members. The promotion of consistent condom use is fundamental to reducing HIV incidence among military personnel and should be integrated with other interventions to create a more comprehensive HIV prevention response. Additionally, the distribution of a desirable and appealing condom is important in encouraging and increasing use. Results suggest that scented condoms and condoms packaged in customized military wrappers may improve condom use and are a cost-effective response to reducing HIV risk; the cost of procuring the military wrapper with a scented condom is negligible (US\$0.03 per condom). As the HIV epidemic continues, other innovative ways of increasing condom use among military personnel should be explored.

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