

Psychosocial and behavioural correlates of attitudes towards antiretroviral therapy (ART) in a sample of South African mineworkers

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Abstract

Despite being one of the worst affected sectors in South Africa, the mining sector has proven to be one of the most active in intervention efforts in the fight against HIV and AIDS (Ellis, 2007). Owing to low uptake rates of antiretroviral therapy (ART) in mining companies in recent years (Connelly & Rosen, 2006) and the positive relationship between attitudes towards ART and ART uptake (Cooper *et al.*, 2002; Horne, Cooper, Gellaitry, Leake, & Fisher, 2007), this study sought to describe and investigate the psychosocial and behavioural correlates of attitudes towards ART in a sample of South African mineworkers. A total of 806 mineworkers from a large South African mine participated in this quantitative study. Despite a high rate of HIV testing behaviour (83.0%) as well as favourable attitudes towards ART, analysis indicated that temporary employees and contractors were more vulnerable in terms of HIV risk, HIV testing behaviours and ART knowledge and attitudes. Employees who had more positive attitudes towards ART were more knowledgeable of ART and, importantly, had a more favourable attitude towards the mine's HIV/AIDS treatment programme. These findings are discussed in relation to the low ART uptake rates in this context and recommendations for the improvement of ART uptake amongst employees at this mining site.

Keywords: mining sector, workplace, ART uptake, attitudes.

Résumé

Le secteur minier reste l'un des secteurs les plus affectés par le VIH et SIDA en Afrique du Sud et aussi l'un des plus actifs dans la lutte contre la maladie (Ellis, 2007). En raison du faible taux d'utilisation de la thérapie antirétrovirale (ART) dans les années récentes par des compagnies minières (Connelly & Rosen, 2006) et les attitudes positives envers ART et ART absorption (Cooper *et al.*, 2002; Horne, Cooper, Gellaitry, Leake, & Fisher, 2007) pour trouver des solutions pour les malades du VIH/SIDA, cette étude a pour objectif d'examiner les comportements psychosociaux et le traitement de la thérapie antirétrovirale d'un groupe de mineurs Sud-Africains. Huit cent six mineurs Sud-Africains ont participé à cette étude quantitative. Soit un taux de dépistage VIH élevé (83.0%) et des attitudes très favorables envers ART, les analyses indiquent qu'en termes de risque du VIH les employés temporaires et les entrepreneurs sont plus exposés à la maladie. Mais cependant, les employés qui sont bien informés de la méthode ART grâce à la connaissance et à l'information bénéficient d'un programme de traitement contre le VIH/SIDA. Ces résultats font l'objet de discussion sur le faible taux d'ART dans ce contexte et quelques recommandations et améliorations de l'absorption de l'ART pour les employés de ce site minier.

Mots clés: le secteur minier, lieu de travail, ART, absorption, attitudes.

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Introduction

The HIV epidemic continues to spread within South African workplaces, notwithstanding broad-scale prevention efforts and attempts to reduce HIV transmission. Owing to higher HIV infection rates among less skilled echelons of the workforce, the mining sector is particularly vulnerable to the HIV epidemic because of the high concentration of semi- and unskilled workers in its employee base (Ellis, 2007). Moreover, the mining sector is faced with the heaviest financial burden given that the highest HIV prevalence rates are found within the 30 - 39 age group, which is the largest category of mineworkers as well as economically the most productive group (Matangi, 2006; Stevens, Apostolellis, Napier, Scott, & Gresak, 2006).

In this regard, South African research reveals that mineworkers have the highest HIV prevalence rate compared with other sectors (Evian, Fox, MacLeod, Slotow, & Rosen, 2004). Evian *et al.* (2004) identified a HIV prevalence rate of 18% in their sample of mineworkers, while HIV infection rates as high as 24.6% and 29% respectively have been found to exist among mineworkers at Anglo-Platinum and within the Carlton goldmining community (Gilgen *et al.*, 2001; Stevens *et al.*, 2006). According to Rander (2007), in 2006 gold mines had the highest HIV infection rates (29.2%) followed by platinum mines (20.3%), coal mines (17.6%), and diamond mines (10.2%). Primary factors implicated in the particularly high HIV infection rates among mineworkers in South Africa include long periods of separation from regular partners, a lack of extra-curricular activities, overcrowded dormitories at the mines, easy access to commercial sex workers, and a higher wage rate relative to other men resident in mining communities (Ellis, 2007; Gilgen *et al.*, 2001).

Research has shown that high HIV infection rates in South Africa are placing a considerable financial burden on mining companies through their impact on direct and indirect costs (Davies, de Bruin, Deysel & Strydom, 2002; Ellis, 2007; Matangi, 2006). Ellis' (2007) company survey showed that 64% of mining companies in South Africa believed that HIV and AIDS had resulted in lower productivity, 60% believed it had resulted in a loss of experience and vital skills, 52% said it had caused higher turnover costs, and 50% agreed it was responsible for higher recruitment and training costs. Moreover, 55% of mining companies were reportedly already experiencing a decrease in profits due to the impact of HIV and AIDS on their workforces.

In light of the relatively high HIV prevalence rates and the cost of HIV and AIDS to South African mining companies, the role of workplace ART programmes appears crucial to the management of employees' HIV infection and productivity. Research has demonstrated that workplace HIV/AIDS programmes can provide rapid and widespread provision of ART and may indeed be effective in promoting treatment uptake and maintaining individuals on antiretroviral (ARV) medication (Charalambous *et al.*, 2007). According to George and Quinlan (2009), the provision of ART to employees is largely motivated by the economic objective of preserving worker productivity in the hope that recruitment, training and absenteeism costs may be contained.

The mining sector has historically been at the forefront of the fight against HIV and AIDS compared with other sectors in the economy (Connelly & Rosen, 2006; Ellis, 2007). In a study of 52 private sector businesses in South Africa, 75% of mining sector companies were found to provide ART to its employees. Mining companies had the highest proportion of employees enrolled in HIV disease management programmes (DMPs) (8.7%) as well as the highest proportion of these employees on ART (12.2%) (Connelly & Rosen, 2006). Similarly, the findings of Ellis' (2007) study indicated that 40% of the mining companies sampled had implemented a HIV care and treatment programme, while 26% had implemented an ART programme. Within the mining sector, diamond mines had the highest recorded ART uptake rate in both 2005 and 2006 as well as the highest uptake of employees into wellness programmes (51%) in 2006. Gold mines, in contrast, had the lowest recorded uptake of employees into ART programmes in 2005 and 2006, despite having had the highest prevalence of HIV among its mineworkers (29.2%).

Despite the high level of access to ART programmes provided by mining companies to its workforces, the low uptake of these programmes by mineworkers is cause for concern (Connelly & Rosen, 2006). According to Connelly and Rosen (2006), in terms of the number of employees in DMPs only 12.2% of mineworkers were enrolled in workplace ART programmes, despite 90% of these mineworkers having had access to ART. At the site of the study that is being reported on, Bhagwanjee, Petersen, Akintola and George (2008) found a relatively low uptake rate into the mine's ART programme, despite an uptake rate of 86% achieved in the 2007 VCT campaign. Significant obstacles emerged in interviews with employees that hindered them from enrolling in the mine's ART programme. These included employee's difficulty in accepting their HIV diagnosis, reluctance to commit to lifelong treatment, confidentiality concerns, fear of stigma, exclusive clinic days for HIV treatment, and beliefs in traditional explanatory models of illness (Bhagwanjee *et al.*, 2008).

Other research has demonstrated a strong association between individuals' attitudes towards ARV medications and their acceptance and use of ARV medications (Cooper *et al.*, 2002; Ezzy, Bartos, O de Visser, & Rosenthal, 1998; Horne *et al.*, 2007; Schrimshaw, Siegel, & Lekas, 2005). Research suggests that individuals holding positive attitudes towards ART are more likely to use ART than individuals who hold less favourable attitudes (Ezzy *et al.*, 1998; McDonald, Bartos, & Rosenthal, 2001; Schrimshaw *et al.*, 2005). Moreover, individuals' attitudes toward ART have even been found to exert a stronger influence on individuals' decisions to begin ART than clinical markers of disease progression and individuals' experience of deteriorating health (Ezzy *et al.*, 1998). According to Ezzy *et al.* (1998), attitudes to ART are so central to individuals' decision to use ART that 'if current confidence in antiretroviral drugs were to change, this would be reflected in an equally rapid cessation of treatment amongst many people living with HIV' (Ezzy *et al.*, 1998, p.1).

In support of this thesis, the findings of other studies have implicated negative attitudes and beliefs towards ART as central reasons for individuals declining HAART from physicians. Studies have shown that low perceptions of personal necessity for HAART, that is a

low perceived need for HAART for controlling one's HIV infection and maintaining health (Horne *et al.*, 2007), and high concerns about the potential adverse consequences of HAART, significantly predicted poor uptake of HAART amongst participants (Cooper *et al.*, 2002; Gellaitry, Cooper, Davis, Fisher, Leake, & Horne, 2005; Grant, Logie, Masura, Gorman, & Murray, 2008). Low personal necessity and high concerns about HAART determined individuals' decisions to decline HAART from physicians even when controlling for the influence of clinical variables such as viral load, CD4 count and time since diagnosis (Horne *et al.*, 2007). In addition to these concerns, negative community myths and beliefs regarding ARV medication have also been found to exert a profound influence on individuals' beliefs about ARV medications and their unwillingness to access treatment (Grant *et al.*, 2008).

The above findings indicate that attitudes toward ART are a strong correlate of uptake into ART programmes. Moreover, the influence of personal attitudes and beliefs on individuals' treatment decisions can even outweigh individuals' clinical imperative for treatment (Ezzy *et al.*, 1998; Horne *et al.*, 2007). Research has identified multiple factors that can influence personal attitudes towards ART such that attitudes will not be uniformly distributed within a population. In particular, attitudes to ART have been shown to vary over time (Grant *et al.*, 2008; Schrimshaw *et al.*, 2005) and to be influenced by factors including personal experience, past treatment successes, VCT exposure (Cooper *et al.*, 2002), community beliefs and attitudes, and the attitudes and opinions of significant others (Grant *et al.*, 2008; Schrimshaw *et al.*, 2005). Attitudes towards ART vary across race and ethnic groups (Schrimshaw *et al.*, 2005) as well as gender (McDonald *et al.*, 2001).

Given that numerous studies have highlighted the significant influence of attitudes towards ART in individuals' decisions to begin and use ART, this research investigated the psychosocial and behavioural correlates of attitudes towards ART in a sample of South African mineworkers. More specifically, the primary aim was to investigate psychosocial and behavioural constructs (VCT, work place perceptions of the ART programme, HIV risk infection and HIV testing) and their association with general attitudes towards ART amongst a sample of mineworkers. An ancillary aim was to provide descriptive data on the sample in terms of sexual risk profile, HIV testing behaviours, knowledge and attitudes towards HIV testing.

The rationale for this study was motivated by the apparent paucity of studies which have investigated attitudes towards ART as a primary variable of interest as well as the need to contribute towards an understanding of the reasons for the reportedly low ART uptake rates in South African workplaces.

Methods

The study site and context

The study was conducted at one of the sites of a corporate diamond mining company in South Africa. At the time of data collection, the entire employee population at the site comprised of 2 801 employees, consisting of approximately 951 (33.9%) permanent employees, 250 (8.9%) temporary employees, and almost 1 600 (57.2%) contract workers. Over the previous 8 years the company, with the support of organised labour, had developed an integrated strategy for the

management of HIV and AIDS across all their mining sites, which included policy, prevention and treatment initiatives.

In terms of the mining company's policy, VCT was made available to permanent and temporary employees, contractors and their spouses/life partners, with treatment being effected through clinics based at the mining sites. The VCT programme at the study site took the form of annual opt-in VCT campaigns, where a local service provider was used to take the company's VCT service directly to employees in their work units. Using saliva-based rapid screening backed by standard pre-test and post-test counselling protocols, individuals who tested positive were referred to the site-based company clinic for treatment.

With regard to treatment, the mining site utilises the employer-provider model (see Connelly & Rosen, 2006), comprising a mixed model of internally financed and delivered HIV-related treatment and care supported by a closed medical aid scheme. The site's clinic was staffed by a doctor and two full-time nurses. The clinic provides comprehensive medical services, including routine medical screening for all permanent employees. Thus, treatment for all HIV-positive individuals was delivered through this clinic, except for a separate funding arrangement pertained to contractor workers that was managed by an external service provider. While the mine's clinics were tasked with HIV-related treatment delivery, both employees and contractors were free to also seek treatment through community service providers; this made case management difficult, especially in the cases of contractor workers who had varying contract lengths and thus periodically moved off to other sites.

The 2007 VCT campaign at the mining company achieved an exceptional average uptake of 86% (83% of permanent and temporary employees and 90% of contractors had participated); this was in line with the previous year's performance of 84% average VCT uptake. An enduring challenge, however, was a 5-year pattern showing that employees tended to enroll in the treatment programme only when they were in an advanced stage of illness. An average of 20% of employees who tested HIV-positive during the VCT campaigns over that period were registering with the company-sponsored treatment programme. Even so, this rate resembles established trends in the private sector in South Africa (George & Quinlan, 2009).

Participants and procedures

Fieldwork was conducted in December 2008 by a research team that was wholly independent of the mine and its employees. Using group administration procedures, data were collected over a period of 2 weeks, which had been earmarked by the mine for HIV/AIDS awareness activities. Over this short duration, we realistically expected to reach about 1 500 employees (about 55% of the population) using a quota sampling procedure which was stratified by employment status for the population. Problems we encountered relating to poor staff morale as a result of impending retrenchments and tensions between management and union as a result of organisational restructuring. Further restrictions were imposed by management in the aftermath of a fatality that occurred about 2 weeks before the planned survey. We gathered data on two separate occasions during the 2-week period in order to increase representation of employees across the three categories, especially

Table 1. Descriptive statistics for scales

Scale	N	Items	Scale range	Mean	SD	α
Attitudes towards ART	785	4	4 - 12	10.77	1.76	0.68
Knowledge of ART	784	5	5 - 15	12.85	1.97	0.40
Perception of VCT participation at the mine	650	3	3 - 9	8.52	1.10	0.70
Stigma	790	4	4 - 12	4.91	1.77	0.77
Fear of HIV testing	758	5	5 - 15	8.14	2.95	0.78
Behavioural beliefs about VCT participation	777	4	4 - 12	11.51	1.15	0.67
Negative attitudes towards the mine's HIV/AIDS treatment programme	741	8	8 - 24	11.48	.85	0.82
Normative beliefs about VCT participation	749	7	7 - 21	17.01	3.39	0.85
Self-efficacy for limiting HIV risk behaviours	742	4	4 - 12	9.77	2.39	0.79
Barriers to partner HIV testing	680	10	10 - 20	13.50	2.05	0.61
Barriers to partner disclosure	736	4	4 - 12	5.68	1.96	0.67

contract workers who were a mobile population. We were however only able to collect 806 completed questionnaires. The result is a non-probability sample that represents approximately 29% of the workforce, comprising 40.2% of the permanent employee population, 21.8% of the contractor population and 26.8% of the temporary employee population.¹ The sample recruited according to employment status over-represents the proportion of permanent and temporary employees in the population, while the contractor population is underrepresented.

Standard protocols were followed in securing ethical approval for the study from the University of KwaZulu-Natal, and in obtaining permission and informed consent from all relevant mine stakeholders as well as from all research participants. The survey questionnaire was originally created in English and was subsequently translated into the other three most common languages used at the study site. Translation was performed by two bilingual speakers for each language, with one translating the scales from English to either Setswana, Afrikaans or isiPedi and the other translator independently back-translating the scale to English. Discrepancies in meaning that occurred in the translation were corrected by third parties who were independent language experts.

Measures

The survey questionnaire included question items that elicited information about the biographical characteristics of the participants and eleven scales related to VCT, work place perceptions of the ART programme, HIV risk infection, HIV testing and attitudes towards ART.

Biographical questionnaire

The first part of the biographical questionnaire contained questions that solicited information regarding age, gender, employment status and marital status. The second part required participants to answer questions regarding the following: sexual risk practices (16 items), their reasons for having a HIV test at the mine's VCT campaign (7 items), knowledge about HIV testing (3 items), attitudes towards HIV testing (4 items), HIV testing behaviour (6 items) and condom use and sexual behaviour (16 items).

In terms of the psychosocial and behavioural constructs related to VCT, work place perceptions of the ART programme, HIV risk

infection and HIV testing and attitudes towards ART, the study methodology required short and concise measures which also had high levels of face validity with the mineworker population. This necessitated existing measures (local or international) and measures based on findings gleaned from the first phase qualitative study (Bhagwanjee *et al.*, 2008). Descriptive information of the measures that were used and their alpha co-efficients can be found in Table 1. Variations in sample size for scales were as a result of missing values on individual scale items. Only respondents who completed all items in each scale were treated as valid cases for computation of the scale reliabilities.

Attitudes towards ART

To measure participants' attitudes towards ART participants were asked their level of agreement with items such as 'The good things about ART outweigh the bad', 'People should not take ART because of its side-effects', and 'People should not take antiretroviral treatment because it involves taking too many pills'. Responses were coded on a 3-point Likert scale (1=disagree, 3=agree) (Boshamer and Bruce, 1999).

Knowledge of ART

Participants' knowledge of ART was assessed using items that were adapted by Boshamer and Bruce (1995). Scale items included statements such as 'A person with AIDS must stay on ART even if s/he feels better' and 'ART can completely cure a person of HIV/AIDS'.

Perception of VCT participation at the mine

This scale was devised in accordance with the findings from the first phase qualitative study (Bhagwanjee *et al.*, 2008) and assessed participant's perceptions of their VCT experience at the mine. Responses were coded on a 3-point Likert scale (1=disagree, 3=agree).

Stigma

To measure the level of stigmatising attitudes participants held towards HIV-positive people participants were asked to express their level of agreement (1=disagree, 3=agree) in regard to items such as 'People who have HIV/AIDS should be ashamed' and 'People with HIV/AIDS should be isolated'. Items used in this short scale were derived from Kalichman *et al.* (2005) and Bhagwanjee (2008).

Fear of HIV testing

Participants were asked to rate their level of agreement (1=disagree, 3=agree) with five statements that related to reasons for being afraid of having a HIV test. The scale included items such as 'It is like a death sentence' and 'My colleagues at work might victimise me'. This scale has been previously used in an organisational setting in South Africa and has demonstrated adequate reliability (Bhagwanjee, 2008).

Behavioural beliefs

Participants were asked how strongly they believed that their participation in VCT services would result in particular positive outcomes such as improving their partners' trust in them if the results are negative and helping them to avoid transmitting HIV to their partners. Responses ranged from 'not true' (=1) to 'true' (=3). This scale has been used previously in a study conducted by Kakoko, Åström, Lugoe, and Lie (2006).

Negative attitudes towards the mine's HIV/AIDS treatment programme

This scale evaluated participants' reasons for not wanting to register for the mine's HIV/AIDS treatment programme. This scale was developed by the researchers for the current study based on findings from the qualitative study (Bhagwanjee *et al.*, 2008).

Normative beliefs

Participants were asked how much support they thought they would receive from significant others such as partners, family members, friends, neighbours, work colleagues and supervisors should they wish to go for a HIV test. Response options ranged from 'no support' (=1) to 'a lot of support' (=3). These items had been previously used by Kakoko *et al.* (2006).

Self-efficacy for limiting HIV risk behaviours

This variable was assessed using items that were drawn from a scale developed by Smith, McGraw, Costa, and McKinlay (1996). Participants were asked to indicate how sure they were (1=not sure, 3=very sure) of their ability to engage in health-protective behaviours that would reduce their risk of HIV infection. The full 9-item scale has demonstrated an internal consistency score of 0.75 in a study conducted by Smith *et al.* (1996).

Barriers to partner HIV testing

The items gathered information about participants' reasons for not having brought their partners to the mine for a HIV test, despite the availability of this service for their regular partners. It included items such as 'If my partner is infected with HIV, I would rather not know', and 'My partner will think I don't trust her/him'. This scale has been previously used in an organisational setting in South Africa and has demonstrated adequate reliability (Bhagwanjee *et al.*, 2008).

Barriers to partner disclosure

These items were developed by the researchers, again based on findings from the first phase qualitative study (Bhagwanjee *et al.*, 2008) and assessed the potential obstacles to participants' disclosure of their HIV status to their partners. They included such items as 'I would not tell my partner because I am scared that s/he will leave me' and 'I would not tell my partner because I don't think that s/he will cope with the news'.

Data analysis

The initial analyses included an inspection of descriptive statistics related to biographical data, sexual risk profile of sample, HIV testing behaviours and knowledge and attitudes towards HIV testing. Pearson's *r* coefficients were used to examine association among scales. F tests were used to examine psychosocial and behavioural scale differences as a function of employee status. Chi-square analysis was also used to detect for bivariate relationships between categorical variables. A multiple regression analysis (stepwise method) was used to identify a weighted model of significant correlates of attitudes towards ART. For all inferential analyses alpha was set at $\alpha=0.05$.

Results

Demographic characteristics (Table 2)

Information about participants' employment status was reported by 798 of the 806 participants. Of the 798 participants, the majority of the sample comprised of permanent staff (47.9%) and contractors (43.7%), while 8.4% were temporary staff. The majority of the sample was male (83.3%) with only a small proportion of females (16.7%). Four hundred and twenty-nine participants (54%) were currently either married or living with someone and 321 participants (40.3%) were single. A small proportion of participants (5.7%) were divorced, separated, or widowed.

Table 2. Demographic profile of sample (N=806)

Variables	N	N	% of sample	Chi square value
Employment status*	798			225.36**
Permanent		382	(47.9%)	190.17**
Temporary		67	(8.4%)	
Contractor		349	(43.7%)	287.18**
Gender	800			353.78**
Male		666	(83.3%)	
Female		134	(16.7%)	
Marital status	795			295.97**
Single		321	(40.3%)	
Married / living together		429	(54.0%)	
Divorced / separated / widowed		45	(5.7%)	

*Missing data not included
 *Significant at $p<0.05$
 ** Significant at $p<0.01$.

Table 3. Sexual risk profile of sample (N=806)

Variables	N	Yes	No	Unsure	Chi square value		
Have you had sex within the past month?	785	175 (22.3%)	610 (77.7%)	-	241.05**		
Have you ever been treated for a sexually transmitted infection?	791	694 (87.7%)	97 (12.3%)	-	450.58**		
Have you had an STI infection in the past 12 months?	791	38 (4.8%)	753 (95.2%)	-	646.30**		
Do you personally know someone with HIV or AIDS?	790	462 (58.5%)	328 (41.5%)	-	22.73**		
How many times have you taken an HIV test over the past 3 years?	726				324.21**		
Once		94 (12.9%)					
Twice		165 (22.7%)					
Three or more times		467 (64.4%)					
Have you had an HIV test in the past 12 months?	793	658 (83.0%)	135 (17.0%)	-	344.93**		
Where did you take this test?	714				467.91**		
At the mine		646 (90.5%)					
At a private doctor/state clinic		68 (9.5%)					
How many sexual partners have you had in the past 12 months?	651				327.71**		
One		434 (66.7%)					
Two		93 (14.3%)					
Three or more		124 (19.0%)					
Have you had other sexual partners while being in a relationship with your regular partner?	793	324 (40.9%)	449 (56.6%)	20 (2.5%)	769.00**		
Has your regular partner taken an HIV test in the past 12 months?	795	567 (71.3%)	144 (18.1%)	84 (10.6%)	409.02**		
Do you know the HIV status of your regular sexual partner?	793	604 (76.2%)	138 (17.4%)	51 (6.4%)	571.83**		
Have you had sexual intercourse with someone who has had a STI or was treated for a STI?	795	121 (15.2%)	580 (73.0%)	94 (11.8%)	759.76**		
		<i>Every time</i>	<i>Often</i>	<i>Sometimes</i>	<i>Rarely</i>	<i>Never</i>	<i>Chi square value</i>
How often have you used condoms when having sex with your regular partner(s) in the past month?	626	216 (34.5%)	52 (8.3%)	82 (13.1%)	15 (2.4%)	261 (41.7)	367.85**
How often have you used condoms when having sex with a casual partner(s) in the past month?	437	249 (57.0%)	45 (10.3%)	35 (8.0%)	7 (1.6%)	101 (23.1%)	426.86**
		<i>Often</i>	<i>A few times</i>	<i>Once</i>	<i>Never</i>		
Have you obtained condoms for your own use during the past month?	782	211 (27.0%)	175 (22.4%)	46 (5.8%)	350 (44.8%)		239.80**
		<i>Always</i>	<i>Often</i>	<i>Sometimes</i>	<i>Rarely</i>	<i>Never</i>	
How often have you had condoms easily available to you over the past month?	769	402 (52.2%)	66 (8.6%)	70 (9.1%)	12 (1.6%)	219 (28.5%)	645.70**

Sexual risk profile of sample

The sexual risk profile of the sample is presented in Table 3. A large proportion of participants (71.3%) were aware of their partner having had an HIV test in the past 12 months, while 76.2% of the sample reported knowing their partners' HIV status. Roughly one in four temporary employees (25.4%) and one in five contractors (21.3%) did not know the HIV status of their regular partner compared with 15.6% of permanent employees ($p < 0.05$). The

mean number of sexual partners participants reported having over the past 12 months was 1.52 (SD=0.75).

Self-reported STI prevalence rates were slightly higher among contractors (13%) and permanent employees (12.1%) than among temporary employees (6.1%). Almost one in six participants (15.2%) reported having had sex with someone who had an STI or had been treated for an STI. The prevalence of three or more

sexual partners over the past 12 months was highest amongst temporary employees (23.5%) and contractors (22.2%) compared with permanent employees (15.7%) ($p<0.01$). Of concern, roughly two in five respondents (40.9%) had other sexual partners while being in a relationship with their regular partner. Further, 41.9% of temporary employees reported having other sexual partners while being in a relationship with their regular partner compared with 32.6% of contractors and 26.8% of permanent employees. In spite of the higher prevalence of multiple and concurrent sexual partners reported by temporary employees, this category of employees had the smallest proportion of employees who never used condoms with their regular (33.9%) or casual partners (11.9%). In contrast, permanent employees had the highest prevalence of condom non-use with regular partners (46%) ($p<0.05$) and casual sexual partners (28%).

Table 3 indicates that condom use was generally higher with casual sexual partners than with regular sexual partners. Fifty-seven per cent of participants allegedly used condoms 'every time' with their casual sexual partners in comparison to 34.5% of participants who used condoms every time with regular partners. Similarly, fewer participants reported never using condoms with casual partners (23.1%) compared with 41.7% who never used condoms with their regular partner.

HIV testing

A high rate of HIV testing among participants was apparent. The majority of participants (90.5%) reported taking this test through the VCT services at the mine. Analysis of the number of times participants have had an HIV test in the past 3 years yielded a mean value of 3.08 ($SD=1.77$), which works out to roughly one HIV test per year. Participants were coded into the proportion of participants who had taken an HIV test once (12.9%), twice (22.7%), or three or more times (64.4%) in the past 3 years. A larger proportion of permanent employees had undergone three or more HIV tests in the past 3 years (67.6%), compared with 63.4% of contractors and 47.5% of temporary employees ($p<0.05$). Participants who had taken the test more than once in the past 3 years scored, by comparison, significantly lower on fear towards HIV testing ($p<0.01$), lower stigma towards HIV-infected people ($p<0.05$), lower barriers to partner disclosure ($p>0.005$) and less

negative attitudes towards the company's treatment programme ($p<0.001$). Further, these more regular HIV testers had higher levels of self-efficacy for limiting HIV risk behaviours ($p<0.05$), better knowledge of ART ($p<0.001$) and better attitudes towards ART ($p<0.001$).

The primary reasons offered by participants for their participation in the mine's 2008 VCT campaign related to the convenience of having the counsellors come to their department (79.3%), and the free t-shirt they received for having an HIV test (69.6%). Slightly more than half of the sample had participated in testing because they were concerned about their HIV status (53.6%). A further third of participants participated in the VCT service because they thought that HIV testing was compulsory (34.0%) and because their colleagues had undergone a HIV test and they did not want to be left out (29.3%).

Relationships between psychosocial and behavioural VCT variables and attitudes towards ART

The data analysis found a number of significant correlations between the variables of interest that are reported in Table 4. Participants with positive attitudes towards ART were more likely to have favourable perceptions of their experience of VCT at the mine, $r=0.08$, $p<0.05$, to believe that other people they know will support their decision to have an HIV test, $r=0.12$, $p<0.05$, to believe in the value and benefit of HIV testing, $r=0.09$, $p<0.05$, to feel confident in their ability to perform behaviours that will reduce their risk of contracting HIV, $r=0.36$, $p<0.001$, to have a good knowledge of ART, $r=0.48$, $p<0.001$, and to report a high rate of HIV testing over the past three years, $r=0.16$, $p<0.01$. In contrast, a negative attitude towards ART was significantly associated with stigmatising attitudes, $r=-0.32$, $p<0.001$, perceived barriers to disclosing one's HIV status with their partner, $r=-0.30$, $p<0.001$, greater obstacles to bringing one's partner for a HIV test, $r=-0.20$, $p<0.001$, fear of HIV testing, $r=-0.14$, $p<0.001$, and a negative attitude towards the mine's HIV treatment programme, $r=-0.49$, $p<0.001$.

In terms of employer status a series of F tests revealed that permanent employees had more favourable attitudes towards ART ($M=10.98$, $SD=1.55$) than contractors ($M=10.64$, $SD=1.89$) and temporary staff ($M=10.40$, $SD=2.03$), $F(2, 775)=4.95$, $p<0.01$, as well

Table 4. Correlations for scores on psychosocial and behavioural VCT measures as a function of attitudes towards ART

Scales	AA	PP	S	FT	BB	NA	NB	SE	BT	BD	KA
Attitudes towards ART (AA)											
Perception of VCT participation at the mine (PP)	0.08*										
Stigma (S)	-0.32**	-0.10*									
Fear of HIV testing (FT)	-0.14**	-0.12*	0.30**								
Behavioural beliefs about VCT participation (BB)	0.09*	0.14**	-0.9*	-0.10*							
Negative attitudes towards the mine's HIV/AIDS treatment programme (NA)	-0.49**	-0.16**	0.37**	0.37**							
Normative beliefs about VCT participation (NB)	0.12*	.016**	-0.13**	-0.21**	0.16**	-0.20**					
Self efficacy for limiting HIV risk behaviours (SE)	0.36**		-0.15**	-0.15**		-0.28**					
Barriers to partner HIV testing (BT)	-0.20**		0.11*	0.19**		0.22**	-0.11*				
Barriers to partner disclosure (BD)	-0.30**		0.21**	0.32**	-0.10*	0.44**	-0.20**	-0.15**	0.32**		
Knowledge of ART (KA)	0.48**		-0.17**	-0.14**	0.10*	-0.32**		0.27**	-0.18**	-0.21**	

Significant at: * $p<0.05$; ** $p<0.001$.

Table 5. Regression analysis summary for significant psychosocial and behavioural VCT variables related to attitudes towards ART

Final model †	R ²	B	SEB	β
Final model	0.41			
Knowledge of ART		0.28	0.03	0.32**
Negative attitudes towards the mine's HIV/AIDS treatment programme		-0.13	0.02	-0.28**
Self efficacy for limiting HIV risk behaviours		0.12	0.03	0.16**
Stigma		-0.13	0.04	-0.13**
Barriers to partner HIV testing		-0.06	0.03	-0.07*

Significant at: * $p < 0.05$; ** $p < 0.001$.

† Only significant scales are reported. Scales found not significant in stepwise regression: perceptions of participation in VCT; fear of HIV testing; behavioural beliefs about VCT participation; normative beliefs about VCT participation; barriers to partner disclosure.

as a better knowledge of ART ($M=13.04$, $SD=1.91$) compared with contractors ($M=12.66$, $SD=1.96$) and temporary staff ($M=12.55$, $SD=2.07$), $F(2, 774)=5.37$, $p < 0.01$. Permanent employees also scored significantly lower on perceived barriers to partner HIV testing ($M=13.02$, $SD=1.96$) than temporary staff ($M=14.10$, $SD=2.33$) and contractors ($M=13.84$, $SD=1.93$), $F(2, 671)=16.23$, $p < 0.001$. Contractors exhibited higher stigmatising attitudes towards HIV-positive people ($M=5.07$, $SD=1.89$) than permanent ($M=4.76$, $SD=1.65$) and temporary employees ($M=4.77$, $SD=1.58$), $F(2, 780)=3.10$, $p < 0.05$, and perceived less confidence in their ability to engage in behaviours that would reduce their chances of HIV infection ($M=9.48$, $SD=2.70$) compared with temporary ($M=10.33$, $SD=1.81$) and permanent employees ($M=9.96$, $SD=2.13$), $F(2, 732)=5.27$, $p < 0.01$).

Multiple regression analysis using the step-wise method was conducted to determine whether psychosocial and behavioural constructs related to VCT significantly predicted attitudes towards ART. As noted in Table 5, ten independent variables were entered into the model. In the final model, five variables were identified as being significant. The tolerance values for each of the independent variables included in the regression model were examined for the effects of multicollinearity. Tolerance values for all the items were found to be satisfactory and above the cut-off point of 0.10 recommended by Pallant (2005). The final model accounted for a significant proportion of the variation in participants' scores for attitudes to ART, $F(5, 557)=76.60$, $p < 0.001$. Five variables were identified as significant correlates of the dependent variable and collectively explained 41% of the variance in participants' attitudes to ART. The strongest independent variable was knowledge of ART, $\beta=0.32$, $p < 0.001$, followed by negative attitudes towards the mine's treatment programme, $\beta=-0.28$, $p < 0.001$, self-efficacy for limiting HIV risk behaviours, $\beta=0.16$, $p < 0.001$, stigma, $\beta=-0.13$, $p < 0.001$, and barriers to partner HIV testing, $\beta=0.07$, $p < 0.05$.

Discussion

High rate of HIV testing behaviour at the mine

The results revealed a high rate of HIV testing behaviour (83.0%) among participants at the mine, with the majority choosing to have an HIV test through the mine's VCT service (90.3%). This figure is significantly higher than the VCT uptake rates documented at AngloGold Ashanti (10%), Anglo Platinum (15%) and Anglo Coal (63%) (Brink, 2005). Furthermore, the results indicated

that participants were averaging three HIV tests every 3 years or one HIV test each year. Interestingly, regular HIV testing was associated with more HIV risk-protective attitudes and behaviours. The high rate of VCT uptake may be explained by contextual factors such as the convenience of having the counsellors come to their department rather than having to choose to present themselves to a central testing venue, and receiving a free t-shirt. When we consider that only half of participants participating in the VCT campaign were concerned about their HIV status, it appears that workplace norms clearly had a positive influence on participants' decision to test. Roughly one-third of the participants tested because their colleagues had done so (29.3%) and because they believed testing to be mandatory (34%). These findings are consistent with the qualitative study (Bhagwanjee *et al.* 2008) at the same site and underscore the importance of peer and workplace norms and stability of employment in influencing individuals' decisions to access VCT, as well as the role that the marketing and communication of VCT in the workplace can play in this regard. As laudable as this success story might be, the fact that a significant proportion of participants believed that testing was compulsory is of concern from an ethical and human rights perspective.

Of concern was the finding that only 57% of the sample reportedly used condoms 'every time' with their casual partners, meaning that over two-fifths of the sample (43%) exposed themselves to risk of STI and HIV infection through high-risk casual sexual liaisons. This is a surprising finding given the high prevalence of HIV testing found among employees, suggesting that perhaps the issue of condom use is not being effectively addressed within counselling services. This is supported by the finding that permanent employees who had a higher prevalence of HIV testing over the past 3-year period, and thereby greater exposure to counselling services, also reported a lower rate of condom use with their casual sexual partners. The fact that the majority of participants (76.2%) were reportedly aware of the HIV status of their regular sexual partner (though it is not possible to confirm whether this was on the basis of supposition or evidence of the partner's HIV test result), could serve to explain the lower rates of condom use practised with regular sexual partners in comparison to casual sexual partners. Permanent employees, for instance, were more likely to be aware of their partners' HIV status and, yet, were more likely to report never using a condom with their regular partners over the past month. The higher rate of condom use by temporary employees with both

their regular and casual sexual partners could be accounted for by the higher number of sexual partners and concurrent sexual partners which temporary employees reported, which would place them at greater risk of contracting HIV.

Attitudes towards ART

Poor attitudes towards ART were found among individuals who held stigmatising attitudes towards HIV-positive people, $r=-0.32$. Research undertaken by Grant *et al.* (2008) has highlighted the relationship between stigmatising communal attitudes and negative attitudes and beliefs relating to ART. Their findings showed that within a stigmatising and blaming community, the most prevalent beliefs and myths about ART centre upon the detrimental impact ARV medication can have on individuals' health, sexuality and parenthood. Fear of HIV testing was also significantly associated with poorer evaluations of ART, $r=-0.14$, as well as a negative attitude towards the mine's HIV/AIDS treatment programme, $r=0.37$. In this regard, it may be reasoned that individuals who hold negative evaluations of antiretroviral medications and the available treatment services will be more fearful of undergoing an HIV test than individuals who hold favourable views towards ART and local treatment services. This implies that positive appraisals of the value and efficacy of ARV medications and local treatment services may moderate individuals' fears and anxieties about having an HIV test.

In addition to the above, the results also revealed a positive relationship between individuals' HIV testing behaviour and attitudes towards ART. Individuals who held positive views regarding the benefits and value of ART reported more HIV tests over the past 3 years. This finding is supported by previous research which has shown that within communities that have undergone a positive change in their beliefs and evaluations of ART, their corresponding views of the importance and benefit of HIV testing became more positive, to the extent that their participation in VCT services increased substantially (Grant *et al.*, 2008).

The multiple regression model revealed that a good knowledge of ART was found to be the strongest correlate of favourable attitudes towards ART, $\beta=0.32$, which highlights the crucial role of knowledge and information in improving individuals' attitudes and acceptance of ARV medications. The influence of knowledge and information on individuals' decision-making and uptake of ART has been shown in other studies to play a crucial role in participants' decisions to either decline or accept HAART from physicians (Gellaitry *et al.*, 2005). While this finding is noteworthy, it should be noted that the reliability of the knowledge of ART scale was not strong ($\alpha=0.47$). A negative attitude towards the mine's HIV/AIDS treatment programme was inversely related to attitudes toward ART, $\beta=-0.28$. This indicated that individuals' views of the mine's HIV/AIDS treatment programme were strongly related to their views of ART in general. Hence, not holding a positive and supportive attitude towards their workplace ART programme could serve to undermine employees' trust and support for ART programmes in general.

Participants' confidence in their ability to practise risk-reduction behaviours was also found to predict their attitudes toward ART, $\beta=0.16$. This finding suggests that participants with high self-

efficacy in their ability to protect themselves from becoming infected may also hold strong positive beliefs about their ability to manage their ARV treatment in terms of the regimen requirements, the potential side-effects, and its integration into their daily lifestyles. Thus, individuals' self-efficacy beliefs regarding HIV risk reduction may contribute to the development of a more favourable attitude towards ART, because of their perceived ability to manage the requirements of ARV regimens.

The association between stigma and attitudes towards ART, $\beta=-0.13$, highlights the relationship between individuals' attitudes toward ART and their attitudes and beliefs regarding HIV infection. Individuals with a less judgmental attitude and greater acceptance of HIV-positive people may be more likely to hold a favourable opinion of the effectiveness and value of ARV medication, because of its potential to manage individuals' HIV infection and improve quality of life. In contrast, individuals holding stigmatising attitudes may be more inclined to blame HIV-positive people for their infection and, thus, have negative beliefs that are opposed to the use of ARV medications. This relationship between stigma beliefs and ART provision has been found in a study conducted by Roura, Urasa, Busza, Mbata, Wringe, and Zaba (2009) in Tanzania. Their findings suggested that the provision of ART had generated blaming beliefs and other forms of stigma among community leaders who felt that individuals on ART were spreading the disease because they looked attractive, 'moved around', and lived longer now that they were receiving treatment (Roura *et al.*, 2009).

Lastly, perceiving fewer barriers to bringing one's partner for a HIV test significantly predicted favourable attitudes towards ART, $\beta=0.07$. Hence, individuals who were more reluctant and who perceived more obstacles to bringing their partner to the mine for an HIV test were less likely to believe in the value and effectiveness of ARV medications. This finding affirms the apparent relationship between individuals' views toward HIV testing and their attitudes towards ART. Both a personal fear of HIV testing and a reluctance to bring one's partner for a HIV test were significantly associated with holding poorer attitudes towards ART.

Conclusion

This study sought to identify the correlates of attitudes towards ART in a sample of South African mineworkers. A high rate of HIV testing behaviour was found among mineworkers, facilitated in the main by contextual and normative influences. Given that only half of the sample that participated in the mine's VCT service did so because they were concerned about their HIV status, it is clear that other factors such as employment status, attitudes towards the mine's HIV/AIDS treatment programme, peer norms and behaviour, workplace norms and the marketing and communication of the VCT service may have played a significant role in participants' decision to have an HIV test.

Overall, the majority of the sample demonstrated a favourable attitude towards ART. The findings showed that individuals holding positive attitudes towards ART generally hold similar attitudes towards HIV-positive people and engage in a high degree of HIV testing behaviour. Five psychosocial variables were found to significantly predict positive attitudes towards ART. Given the empirical evidence supporting a relationship between attitudes

towards ART and ART uptake (Cooper *et al.*, 2002; Horne, Cooper, Gellaity, Leake, & Fisher, 2007), it is believed that efforts to address and improve these psychosocial variables may be effective in addressing the low uptake of employees into the mine's ART programme. For instance, the primary role of knowledge of ARV medications in influencing individuals' attitudes towards ART underscores the importance of finding more effective ways of communicating accurate information about ARV medication and regimens to HIV patients and their significant others. Similarly, the association between individuals' attitudes towards ART and their self-efficacy beliefs regarding HIV risk reduction suggests that efforts to enhance employees' skills and ability to engage in health-protective behaviours may have the added benefit of improving employees' attitudes towards ART and, for employees in need of ARV medication, their willingness to register with the mine's ARV treatment programme. The findings have also highlighted the importance of the mine's management developing a favourable image of the HIV treatment programme among employees that may assist in improving employees' attitudes to ART. Other interventions and efforts that may prove successful in enhancing ART attitudes and uptake should aim to help employees address any barriers or anxieties hindering them from bringing their partners for HIV testing and to challenge any stigmatising attitudes that employees may hold towards people living with HIV.

It appears that pre- and post-test counselling may be the best vehicle for effectively addressing several of these psychosocial correlates such as ART knowledge, stigma, self-efficacy beliefs and perceived barriers to partner testing. Furthermore, pre- and post-test counselling services should also aim to address some of the negative health attitudes and behaviours that were found among specific job categories such as the poorer knowledge of ART and attitudes to ART found among temporary employees and contractors, contractors' lower confidence in their ability to protect themselves from HIV infection, and lower rates of condoms use among permanent employees.

Intervention efforts also need to consider other sectors of the workforce who maybe less secure in terms of company medical aid entitlements. Further, mineworkers are often migrant workers from other provinces or countries. In this regard, we also need to consider the appropriateness of VCT in terms of language and cultural issues as well as the right to access care.

The purposive nature of the sample requires that the results of this study should be seen as tentative. Further, we note that contractors and temporary employees of this diamond mine were under-represented in the final sample. Caution should thus be exercised when making summative arguments regarding employee status and HIV risk and ART uptake in the mining sector. Further, we do acknowledge that data with regard to sexual behavioural practices were only accessed by means of self-reports. Generalisation of findings to other similar settings in South Africa is therefore limited by these factors. Longitudinal studies with mineworkers in contexts of high HIV prevalence with corresponding biological markers will be needed to provide a more complete understanding of the relationship between individual and contextual factors related to general attitudes towards ART, actual uptake and adherence to ART in mineworkers.

Footnote

¹Krejcie and Morgan (1970) indicate that for a population of 2 800, a minimum sample size should be 338 (95% confidence interval).

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