

Social Interactions Research Proposal

Pluralistic Ignorance and Condom Use in South Africa

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February 17, 2013

1 Introduction

Almost 6 million people in South Africa are living with HIV/AIDS the highest number for any country in the world (NDH, 2011). The risk is particularly high among young adults, with over a third of people contracting the virus by the age of 30. Many types of interventions have been proffered over the years to increase condom usage, such as education or free distribution programs, but research has shown that knowledge of sexual health risks is not always a good predictor of condom use (Bertrand *et al.*, 1991). Increasingly, scholars are calling on the need to consider behavioral interventions (e.g. Ross 2010) in addressing the paradox of low condom use in high HIV-risk areas. Some research has been conducted to address the importance of norms on condom usage, particularly given that most studies to date have focussed on individual sexuality and risk-taking behavior, rather than sexuality driven by cultural and societal norms or social networks (Abdool Karim *et al.* 1992). This research proposal answers these calls for peer-driven intervention by advancing a field experiment designed to focus on the role of peer effects in targeting condom use.

2 Literature

Peer effects and development

Much has been said already about the importance of peer effects in various branches of development. Miguel & Kremer's (2004) well-cited field experiment in Kenya specifically looked at treatment externalities in the form of within- and between-school peer effects for a child deworming program. A fertilizer adoption experiment in Kenya by Duflo *et al.* (2009) took account of the effect on fertilizer use for neighbors and friends of treated subjects, although results were minimal. Somewhat closer in issue to the current proposal, Godlonton & Thornton (2012) find significant peer effects in proactively seeking out one's HIV status in rural Malawi. The authors found that a 10 percentage point increase in subjects attending HIV clinics as a result of monetary incentives led to a 1.1 percentage point increase in attendance for subjects' neighbors.

Peer effects and youth sexual behavior

The effect of peer influence on decision-making is especially strong for youths, both in developing and developed regions. Previous work has found that peer group norms have a significant effect on various aspects of risky behavior among youths, such as alcohol, tobacco and marijuana use, truancy and the timing of sexual initiation (e.g. [Clark & Lohac 2005](#); [Richards-Shubik 2012](#); [Card & Giuliano 2011](#)). Somewhat self-evidently, sexual behavior is one area where one might expect peer effects and social decisions to play a strong role in decision making. A recent study from US high schools found strong results to support the argument that a combination of peer effects and (internalized) shame are the key drivers to teenage sexual behavior in this demographic ([Fernandez-Villaverde *et al.* 2011](#)). [Ali & Dwyer \(2011\)](#) find evidence of significant peer effects at play in explaining both earlier sexual initiation and increased number of partners among youths in the US. [Lam *et al.* \(2009\)](#) found that the social influence of older classmates played a strong role in the earlier sexual debut of African teenage girls as opposed to their colored and white peers in South Africa.

Pluralistic ignorance

One interesting aspect of peer effects and norm-driven behavior is pluralistic ignorance. This phenomenon refers to situations in which individuals believe that the majority of their group accept a social norm, despite most of them being privately opposed to it. Thus, while perhaps only a few individuals (or even none) may genuinely be in favor of a social norm that may be inefficient or simply welfare-damaging to the group, the behavior persists.

One of the seminal works in this area is by [Prentice & Miller \(1993\)](#), who found strong evidence that pluralistic ignorance had an effect on college binge drinking in the US. Their findings were used as the basis for a field experiment by [Schroeder & Prentice \(1998\)](#), whose peer-orientated intervention based on breaking down pluralistic ignorance led to a significant reduction in binge drinking. Subsequent investigations into this area have found effects of pluralistic ignorance on various topics, such as reported sexual harassment ([Halbesleben 2009](#)) and tax compliance ([Wenzel 2005](#)). Specifically among youth behavior, pluralistic ignorance has been found to cast a significant influence on youth levels of casual sex ([Lambert *et al.* 2003](#)), smoking and illegal drug use ([Hines *et al.* 2002](#)) and bullying ([Sandstrom *et al.* 2012](#)).

Evidence of social norms and condom use

Given the strong link between peer effects and sexual behavior, it is perhaps unsurprising that pluralistic ignorance has also been found to play a significant role in explaining low condom use by youths (e.g. [Hynie *et al.* 1998](#); [Lewis *et al.* 2007](#)). Stigmas and false beliefs over group preferences have even been found to cause condom aversion in high HIV-risk areas ([Latkin *et al.* 2003](#)). Particularly in developing countries, risky sexual behavior appears to persist despite high levels of knowledge about contraception among adolescents, and a lack

of support for access or economic explanations (Curtis & Westoff 1996). This evidence has driven the rising opinion among experts that pluralistic ignorance is a key driver behind behavior responsible for spreading HIV in Africa, and that behavioral interventions are therefore critical to tackling the spread of the virus.

Why do youths believe that their peers disapprove of condom use? In other words, what justifications are given to reinforce these group norms? The stigmas behind the pluralistic ignorance can be broken into three categories, depending on whether they affect one or the other gender, or both. Particularly in Africa, condoms are seen to undermine a young male’s masculinity, stemming from both a belief that condom use diminishes a man’s sexual pleasure and that it sends a signal of lower fertility (Preston-Whyte & Zondi 1991; Abdool Karim *et al.* 1992). Related to this is the norm that women should prioritize a man’s sexual pleasure during sex, and therefore should not say no to proffered unprotected sex (Obbo 1993), nor be the one to initiate condom negotiations pre-intercourse (MacPhail & Campbell 2001). Moreover, many girls are reluctant to carry condoms for fear of being labeled promiscuous, which was found to lead to strong negative attitudes towards condom use in many parts of Africa (e.g Sunmola 2005; Edem & Harvey 1995; Feldman *et al.* 1997; Havanon *et al.* 1993). Finally, among both males and females in Africa, powerful stigmas exist that declare that youths who suggests using a condom lack trust in their partners, or, even more off-putting, are likely to have AIDS themselves. Whatever the primary driver, the evidence in recent years of the powerful effect of normative forces on condom usage demands a closer investigation of behavioral intervention strategies.

3 Theoretical background

The role of pluralistic ignorance in leading to negative group behavioral equilibria can be modeled in a roundabout way through use of Brock & Durlauf’s (2001) social interactions model of discrete choice. Their specified utility function (1):

$$V(\omega_i) = u(\omega_i) + S(\omega_i, \mu_i^e(\omega_{-i})) + \epsilon(\omega_i) \quad (1)$$

can be interpreted as the payoffs to an individual faced with a choice between protected ($\omega = 1$) and unprotected sex ($\omega = -1$). In this model, u_{ω_i} could represent the private (expected) utility derived from sex with a condom, taking into account, for example, the reduced expected risk of infection (against any disutility from decreased sexual pleasure). Assuming, as the research suggests, that individuals in developing countries are well informed about the function and use of condoms and have easy, cheap (possibly costless) access to them, one could reasonably imagine that $u(1) \gg u(-1)$. That is, in the absence of social interaction effects, all individuals prefer to use condoms (save, perhaps, for the extremely present-biased).

$S(\omega_i, \mu_i^e(\omega_{-i}))$ is a social utility term that depends on the congruence between the individual’s own action and her beliefs about the group’s actions

(formally, the conditional probability i places on the choice of others). $\epsilon(\omega_i)$ is a random i.i.d. error term, known to i at the time of her decision. Assuming social utility exhibits constant and totalistic strategic complementarity, one could, for example, adopt the proportional spillovers specification of social utility:

$$S(\omega_i, \bar{m}_i^e) = J\omega_i\bar{m}_i^e \quad (2)$$

...where \bar{m}_i^e represents expected average choices and $J > 0$. [Brock & Durlauf 2001](#) show that under rational expectations and for different parameterizations of the separate components of the payoff function (private utility, social utility and the density of the error term), multiple equilibria can exist. Thus, due to strong conformity pressures, a situation of pluralistic ignorance in which the majority of the group chooses against using condoms can arise and persist. Intuitively, this ‘bad’ dynamic equilibrium would require:

- that social utility is given a relatively high weighting when compared to private utility ($J \uparrow$);
- that the distribution of the difference in errors is parameterized such that deterministic utility plays a large enough role on the decision making (relative to the errors); and
- that the initial pre-choice state had a large enough proportion of people not using condoms.

One can quite easily form qualitative arguments to support these general conditions, based on sociological theory of culture and traditions in many parts of African society. Strong social pressures through accepted community stigmas, high levels of awareness of both these stigmas and information about condom use, and the historical salience of the community before contraceptive availability could provide the right conditions to propel a society into a negative equilibrium of low condom use and, consequently, high HIV risk.

4 Design

The proposed experiment investigates the impact of educating youths about pluralistic ignorance on condom usage. The subject area holds many econometric complications, including the high probability of treatment externalities, difficulties in measuring spillover effects, and self-reporting bias for condom use. To address these issues, the proposed approach draws inspiration from five separate studies. [Schroeder & Prentice 1998](#) conducted a pivotal experiment on university students in the United States to test the effect of pluralistic ignorance education on college binge drinking. The current proposal will closely follow their design in terms of the intervention, with appropriate modifications. Secondly, this treatment will be applied as an extension to the work of [MacPhail & Campbell 2001](#) on dominant sexual norms and condom use in South African townships. Thirdly, to ensure externality benefits are accounted for, school-based randomization will be used to measure overall program effects, using a

similar approach to [Miguel & Kremer 2004](#). Fourthly, estimations for spillover effects and saturation levels can be derived from also randomizing school treatment intensity and individual treatment, following techniques recently formalized in [Baird *et al.* 2012](#). Finally, from a methodological perspective, attempts will be made to correct for some of the data collection issues of that project by using the improved audio computer assisted self-interview (ACASI) method for sexual self-reporting, pioneered by [Hewett *et al.* 2004](#).

The target population consists of youths from schools in Khutsong, a small township in South Africa. The community was chosen because previous research has found that levels of HIV are particularly high, but so, too, is knowledge and understanding of HIV transmission and prevention ([Williams *et al.* 2000](#)). Furthermore, [MacPhail & Campbell 2001](#) found that one of the key barriers to individuals using condoms in Khutsong was their having internalised perceived negative attitudes of their peers towards condom use. It is proposed that the study be conducted on randomly selected youths from their final year of high school, with ages ranging from 17 to 20. In this age range, 85% of youths in Khutsong are sexually active (compared to less than 20% before the age of 17), but not yet at peak risk of HIV infection ([MacPhail & Campbell 2001](#)).

Treatment of varying intensities will be randomly assignment to schools from the Khutson region. Relevant characteristics from participating students will be collected by way of a background questionnaire, and will include such measures as age, gender, ethnicity, family income, educational characteristics and other covariates that may be in some way related to sexual behavior and HIV risk. Contrary to [Schroeder & Prentice's \(1998\)](#) who conducted a within-school experiment for college binge-drinking, and to [Miguel & Kremer 2004](#) who randomize at the group level for their deworming program, the current proposal employs a two-level randomization design in the spirit of [Baird *et al.* 2012](#). Students are randomly selected within a school to receive treatment, and treatment intensities themselves (ranging from 0% to 100% in 10% intervals) are randomized between schools. This enables minimization of additional treatment externalities arising from the direct social interactions associated with sexual intercourse, as well as estimation of spillover effects.

While this raises additional logistical and financial difficulties for the researcher, such issues are preferable to the econometric problems associated with low power and a probable violation of the stable unit treatment value assumption (SUTVA). This violation is due to the fact that youths are more likely to engage in sexual activity with those with whom they are in regular contact, coupled with the shared nature of our outcome variable (condom usage) between control and treatment subjects. This is to say, if only within-school randomization were employed, the sexual partners of the treated could well be those from the control group. Since the outcome variable (condom use) in this case is most definitely influenced by the treatment status of one's sexual partner, there would, in the terminology of [Manski 1993](#), most likely exist endogenous effects and thus a strong violation of SUTVA.

It is unlikely that schools would query participation because of the risk of being randomized into a low-intensity group. This is because, in the proposed design, the control treatment consists not of a placebo treatment, but

of an individual-orientated discussion targeted at individual decision making and sexual behavior. The peer-versus-individual discussion groups emulate the design of [Schroeder & Prentice 1998](#) and minimizes the risk of educational or informational effects being mistaken for the breakdown of social norms. The subsequent benefit afforded the control groups should ensure school compliance to the ‘true randomization’ design.

Moreover, such a control treatment is unlikely to have a negative impact on condom use, and could well see positive results (albeit slight, according to [Williams *et al.* 2000](#); and [Bertrand *et al.* 1991](#)). To this end, any error in the observed treatment effect is likely to be an understatement of the true program effect. Since students in both groups share exposure to education on this issue, the study controls to a large degree for any educational or priming effects on condom use and instead isolates the effects of peer-orientated discussion and targeting pluralistic ignorance.

Procedure

The procedure is proposed as follows. From each of g schools, treatment intensity is randomly assigned, and students within each school are randomly selected to receive treatment until the given intensity is met. With the help of a local non-governmental organization focussed on HIV prevention, the schools will assign treated students to attend a series of peer-orientated discussions, while the control students will receive individual-orientated discussions. The discussions will consist of one 1.5-hour session a month, for three months. While the format of the discussions will be the same, the topics will differ as follows:

- In the individual-orientated discussions, students will be asked to discuss hypothetical situations in which sexual interaction is likely to occur, to identify influences and factors affecting decision making in such circumstances, and to reflect on the costs and benefits of protected and unprotected sex.
- In the peer-orientated discussions, the conversation will be centred around social stigmas about sexual behavior, the concept of pluralistic ignorance and how it might apply to the use of condoms.

The NGO discussion promoters will alternate between the treatment and control groups over the three sessions so as to minimise interviewer effects. Before the first session, students will complete a brief questionnaire of background characteristics and sexual behavior. The baseline survey will also seek to elicit knowledge and understanding of: HIV transmission and prevention; acquiring and using condoms; and general HIV risks in their community. Before each session, students will again be asked to complete a survey of their sexual behavior over the interim; their perceptions of group attitudes towards condom use and sexual behavior; and their fear of peer evaluation. The latter will use the short form of [Watson & Friend’s \(1969\)](#) Fear of Negative Evaluation Scale. Finally, a follow up survey of background characteristics and sexual behavior will be conducted three months after the final session. In all cases, ACASI interviews

will be conducted in order to maximise the consistency of sexual self-reporting answers.

Results will be analysed for those students who report being sexually active both before and after the program. Answers to condom usage during sex for the six months since the program’s commencement range on a five-point scale: “Never” (1); “Rarely” (2); “Some of the time” (3); “Most of the time” (4); “Always” (5). The effect of interest is whether condom use among sexually active subjects has increased since the peer-orientated treatment, relative to the control. Due to the preprogram data for both treatment and control groups, it is possible to employ a difference-in-difference estimation technique. In particular, any difference in the mean score reported by the control group before and after the treatment period can be attributed to an educational or ‘priming’ effect. This can be subtracted from the difference in mean reported scores for the treatment group in order to obtain the net average treatment effect on the treated: the increase in self-reported condom use induced by the pluralistic ignorance peer-oriented discussions. The aforementioned constitutes a non-parametric estimate of the average treatment effect on the treated, while the inclusion of the individual and school-level controls from the baseline survey allow an ordinary least squares regression to obtain a more precise estimate.

It will be of interest also to discover whether there are any gender effects from the treatment. Given that many of the hypothesized norms of interest are gender-specific, any significant differences in our results between the males and females in our experiment may shed some light on which of the norms detailed at the outset of this proposal are central to the problem.

5 Empirical Analysis

The two-level randomization approach of [Baird *et al.* 2012](#) requires the assumption that there is no cross-school interference in outcomes. For a given school j , the treatment intensity, or proportion receiving the peer-orientated discussions, is p_j . The outcome variable (condom use) for a student i in school j with treatment status $T_{ij} \in \{0, 1\}$ and relevant covariates X_{ij} is Y_{ij} .

This implies that Y_{ij} is a function of (T_{ij}, p_j, X_{ij}) , which could be linearized as:

$$Y_{ij} = \beta_0 + \beta_1 T_{ij} + \beta_2 p_j + \beta_3 X_{ij} + \epsilon_{ij} + v_j \quad (3)$$

where ϵ_{ij} is the individual-specific error and v_j is the common school component of error.

[Baird *et al.* 2012](#) demonstrate that this design and specification allows calculation of the Intention to Treat effect (ITT), average spillover effects on the non-treated (ASNT) and treated (AST), the Total Causal Effect (TCE), Treatment on the Treated (ToT) and Treatment on the Uniquely Treated (TUT), conditional on the treatment intensity p , as follows:

$$ITT(p) = E(Y|T = 1, p) - E(Y|T = 0, p = 0) \quad (4)$$

$$ASNT(p) = E(Y|T = 0, p) - E(Y|T = 0, p = 0) \quad (5)$$

$$AST(p) = E(Y|T = 1, p) - E(Y|T = 1, p = 0) \quad (6)$$

$$ToT(p) = E(Y|T = 1, p) - E(Y|T = 0, p = 0) \quad (7)$$

$$TCE(p) = E(Y|p) - E(Y|p = 0) \quad (8)$$

$$= p.ITT(p) + (1 - p).ASNT(p) \quad (9)$$

$$TUT = E(Y|T = 1, p = 0) - E(Y|T = 0, p = 0) \quad (10)$$

$$= ToT(p) - AST(p) \quad (11)$$

The two-level randomization design accounts for the individual-level bias from endogenous spillover effects as well as being able to account for spillover effects and ToT estimation through the varying intensities of treatment between schools. For a comprehensive power analysis of a two-level randomization design, see [Baird et al. 2012](#). Note, however, the somewhat intuitive result that the standard error of the estimated average treatment effect is smaller than that of a pure group randomization design but greater than randomization at the individual level alone, for given n , g and other common parameters.

6 Risks

A chief concern for interpreting the results of the proposed experiment, even with the two-level randomization design, is the risk of spillover effects between students of different schools through sexual interactions or peer influence. This is a key assumption of the [Baird et al. 2012](#) design, but youth networks naturally extend outside of the school environment, as do channels and forums for the development and culturing of peer influence.

Secondly, while the proposal adopts ACASI interviews to improve the consistency of the data, there may still remain some bias due to the self-reporting surveys and the sensitive nature of the questions. At the time of writing, there does not appear to be a better, more practical method for collecting data on condom use to date, and furthermore, any remaining bias is again likely to underestimate rather than overestimate the measured treatment effect. However, one possible case that would overestimate the strength of the intervention would be if the peer orientated discussions in some way reduced the level of embarrassment in self-reporting sexual behavior. It appears unlikely, however, that any effect on reducing the residual self-reporting bias would differ in magnitude between the peer- and individual-orientated discussion groups.

Finally, six months was chosen as the time interval between the baseline survey and the exit (follow-up) survey for practical reasons. However, it may be that norms take longer to break down, and, thus, the true effects of the treatment will only manifest themselves later. A search of related literature uncovered no theory or background to inform of a more appropriate interval than that chosen, but finding insignificant results might point to this factor as a potential mask of the impact of the proposed intervention.

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