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HIV Prevention and Social Desirability: Husband – Wife Discrepancies in Reports of Condom Use

Greater use of condoms within marriage would help limit the spread of HIV in sub-Saharan Africa. Using data from the Malawi Diffusion and Ideational Change Project (MDICP), the authors examined the influence that the fidelity norm and the traditional association between marriage and reproduction have on condom use with a spouse. The sample included 749 married couples. The authors used latent class analysis to estimate a ''true,'' or latent measure of condom use by couples based on the individual reports of husbands and wives and to explore the reasons why individuals tend to misreport their use of condoms. They found that married couples with more children were more likely to use condoms and that having been informed by experts about AIDS prevention at home induced men and women to overreport condom use within marriage in a survey but may not necessarily increase the extent to which condoms are used.

Approximately 67% of all people infected with the HIV virus live in sub-Saharan Africa (UNAIDS & World Health Organization, 2009). Furthermore, HIV infection there is widespread among the heterosexual population (UNAIDS & World Health Organization, 2007, 2008, 2009), and the largest share of new HIV infections is estimated to occur in serodiscordant married or cohabiting couples (Dunkle et al., 2008; Gelmon, Kenya, Oguya, Cheluget, & Haile, 2009). One of the most convincing explanations of the high prevalence of HIV in this region argues that the spread of the epidemic is not due to individuals having high numbers of sexual partners per se but to the common practice of simultaneous long-term relationships (Morris & Kretzschmar, 1995, 1997). In several parts of this region, extramarital sexual relations are common, especially among men. In Malawi, approximately 10% of married men reported having had extramarital sex in the previous 12 months (Malawi Demographic and Health Survey [MDHS], 2004) but, according to data provided by the 2004 Malawi Diffusion and Ideational Change Project (MDICP; see http://www.malawi.pop.upenn.edu/Level%203/Malawi/level3_malawi_main.html), 24% of married men in rural areas reported that their best male married friend had had extramarital sexual partners in the previous year. Women are much less likely to report sexual relations outside of marriage. Nonetheless, some qualitative (Tawfik, 2003; Tawfik & Watkins, 2007) and quantitative studies (de Walque, 2007) have suggested that such affairs may not be rare,

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although researchers have not offered specific estimates. Extramarital sexual relations would explain, at least partially, why two thirds or more of the HIV-infected couples in five sub-Saharan countries are serodiscordant (de Walque). As a result, even faithful married individuals are at high risk of becoming infected, because their partner may have short- and long-term sexual relations outside marriage.

This risk would be considerably less if condom use were a normal practice, but the level of reported condom use is low in casual relations and even lower in marital relations (Bankole, Ahmed, Neema, Ouedraogo, & Konyani, 2007; Chimbiri, 2007; Cleland & Ali, 2006; Westercamp et al., 2010). The lack of condom use in marital relations has important negative consequences for the population, because marriage is the context in which most sexual intercourse takes place, and so the likelihood that a noninfected member of a marital couple will become infected is high. Besides, reproduction is embedded in marriage, and children may become infected during pregnancy or delivery, thus affecting their health, and they are more likely to become orphans, thus affecting their socioeconomic condition.

For these reasons, it is of interest to focus on preventive behavior within marital relations in sub-Saharan countries; specifically, it is important to identify why married individuals have unprotected sexual relations within marriage in societies where extramarital sex is not uncommon, the perceived risk of becoming infected is very high, and the population is knowledgeable about HIV transmission and prevention (Barden-O'Fallon et al., 2004; Lindan et al., 1991; Nachega et al., 2005; Neequaye, Neequaye, & Biggar, 1991).

In this study we had both a substantive and a methodological goal. Substantively, we analyzed the relationship between condom use in marital relations in rural Malawi and three factors that we believe would be an important predictor of it. Methodologically, we sought to overcome the problem that arises when a question asked of both spouses – in this case, whether they use condoms in their marital sexual relations – elicits conflicting responses. To this end, we used latent class models to capture the true or latent response, and we investigated the role of social desirability in explaining the discrepancy between the respondents' manifest and latent responses.

Use of Condoms in Marriage

The Malawian Context

Malawi has a mature HIV epidemic, with a prevalence among adults that exceeds 12% (UNAIDS & World Health Organization, 2009) and an estimated rural prevalence of 10.8%, according to the 2004 MDHS. Malawi exemplifies the problems in the region, given that it is similar to other sub-Saharan countries and to countries classed in the World Bank's (2006) low-income group in terms of life expectancy, educational enrollment, infant mortality, and other indicators. The Malawian rural population is quite aware of the HIV/AIDS epidemic and how HIV is transmitted: More than 70% and 85% of sexually active women and men, respectively, identify abstaining from sex as a way to avoid HIV infection, and almost 60% and 68% of these women and men reported that AIDS can be avoided by using condoms during sex (MDHS, 2004). Low levels of condom use outside and inside marriage do not, therefore, seem to be related to a lack of knowledge about the disease. Moreover, if anything, rural Malawians tend to overestimate the probability of becoming infected through a single act of sexual intercourse with a person who has the virus (Smith & Watkins, 2005). According to the MDICP, even in marital relations, the perception of lower risk does not seem to be the main factor that explains the absence of condom use, given that approximately 70% and 65% of married women and men, respectively, are worried about becoming infected.

Although the dramatic levels of HIV prevalence have forced government agencies and nongovernmental organizations to promote condom use, public programs and policies tend to associate it with risky sex outside marriage, especially commercial sex (Chimbiri, 2007). Nevertheless, a significant part of the population reports having had some informal conversations about AIDS in which condom use has been considered by some of the interlocutors to be a good strategy against AIDS (Bühler & Kohler, 2003). The percentage of people who said that condom use within marriage is acceptable to protect against HIV infection increased between 1998 and 2004, especially among women (from 15% in 1998 to 42% in 2004; Tavory & Swidler, 2009).

Actual Use of Condoms

We expected that an important factor in determining whether a couple uses condoms in their marital sexual relations is whether the husband or wife believes that his or her spouse has been unfaithful and that there is thus a risk of contracting the HIV virus. Nonetheless, some further facilitating conditions are required in order for condoms to be used, because condom use conflicts with established social norms about marriage. Despite the prevalence of extramarital sexual activity (MDHS, 2000, 2004), marriage in Malawi, as in other sub-Saharan countries (D. J. Smith, 2006), is supposed to be based on trust, faithfulness, and legitimate sex and reproduction, among other social norms (Chimbiri, 2007; K. Smith & Watkins, 2005; Tavory & Swidler, 2009; Watkins, 2004), and this militates against condom use within marriage as a preventive strategy. Attitudes toward the use of condoms are likely to depend, in part, on personal beliefs or expectations about the social acceptability of condom use that individuals update through social interactions. Individuals who perceive that extramarital sexual relations are common among the people with whom they usually talk may believe that the norm of marital fidelity is weak, and this may increase their likelihood of using condoms in marriage. A social norm, such as fidelity, exists when a sufficient subset of the population knows the rule and each person prefers to conform to it when he or she believes that a relevant proportion of others expects him or her to conform to the rule (*normative expectations*) and a relevant proportion of others actually conforms to the rule (*empirical expectations*; Bicchieri, 2006). The strength of the norm as a behavioral rule depends on not only the normative but also the empirical expectations. An individual is unlikely to behave according to a norm if he or she believes that only a small proportion of the population does, despite the norm being generally accepted. In that case, condom use would not strongly conflict with the fidelity norm and would be more likely to take place, *ceteris paribus*. This led us to the hypothesis that the spread of unfaithfulness in a social network would affect married couples' preventive behavior, specifically, that condom use within marriage would be more likely when the man's married friends are perceived as unfaithful.

As well as their protective function, condoms are also contraceptives, and these two functions may allow condom use to be interpreted in different ways. Even if the intention to use condoms arises from a wish to protect against infection, husbands and wives may feel more comfortable suggesting this practice as a family planning method because this avoids difficult issues concerning spousal fidelity and trust. Nonetheless, the use of contraceptives may itself conflict with another social norm, namely, the production of children within marriage (Caldwell, 2000; Chimbiri, 2007; Watkins, 2004). But this particular conflict should be less acute the more children a couple already has. We hypothesized that condom use would therefore be more common when both husband and wife agreed on stopping or spacing births; conversely, childlessness should have a negative influence on condom use inside marriage. In our data we lacked a direct measure of husbands' and wives' family planning preferences, and so we used their number of living children as a proxy for this.

In addition, numerous studies have identified age and level of education as factors relevant to contraceptive use and HIV preventive practices (Ali, Cleland, & Carael, 2001; Feyisetan, 2000; Gillespie, Kadiyala, & Greener, 2007; Hargreaves et al., 2008). The residence/marriage system might also affect condom use given that it has been considered a determinant of women's bargaining power and social integration (Helleringer & Kohler, 2005; Reniers, 2008; Takyi & Gyimah, 2007). Whereas in a patrilocal/patrilineal system offspring and material resources are part of the man's kinship group, in a matrilocal/matrilineal system residence is with the mother's family and inheritance is through the mother's brother.

Reported Use of Condoms

On methodological grounds, the ideal research strategy to investigate condom use would involve the collection and analysis of information from both husband and wife. Most studies of preventive sexual behavior, in common with studies of other topics concerning spouses, have conducted separate analyses for women and men. This approach has severe limitations, because the outcome to be explained is not a strictly individual behavior. Moreover, the same person may use condoms with one particular sexual partner but not with another. Couple-based analyses, on the other hand, offer more

comprehensive and realistic models, because they take into consideration information about both of the parties involved in the act of using, or not using, condoms and the interaction between the sexual partners. It is difficult to find empirical couple-based analyses of preventive sexual behavior (Zulu & Chepngeno, 2003), and very few studies have compared wives' and husbands' responses to issues related to HIV prevention (Anglewicz, Bignami-Van Assche, Clark, & Mkandawire, 2010; de Walque, 2007; Miller, Zulu, & Watkins, 2001). Nevertheless, a couple-based approach becomes problematic when it comes to constructing indicators referring to the couple's behavior, as the researcher must decide how to deal with the inevitable husband – wife discrepancies in the reporting of practices such as condom use within marriage. Almost no effort has been made in the literature to identify important causes of discrepancies or biased responses (some exceptions are Harvey, Bird, Henderson, Beckman, & Huszti, 2004; Dinkelman & Lam, 2009; and Miller et al., 2001).

In this article, we develop a couple-based explanatory model of condom use within marriage that identifies and takes into consideration factors that bias individuals' reports of condom use. To this end, we used latent class analysis (LCA; Hagenaars & McCutcheon, 2002; McCutcheon, 1987), which ''models the relationships between sets of categorical or ordinal variables as arising from the common influence of an unobserved, latent variable, having two or more categories or classes'' (Breen, 2000, p. 375). In our case the latent, unobserved variable is the true use of condoms by the couple, and the manifest variables are the husband's and wife's responses to the question of whether they use condoms within marriage plus other variables that explain condom use or bias the report of it. In other words, we estimated a measurement model and a structural model simultaneously. The former attempts to uncover the true degree of condom use in marriage, whereas the latter attempts to assess the effect of a set of explanatory variables on this (presumably) true response.

This methodological strategy has two main advantages for our study. On the one hand, we can carry out a couple-level analysis of preventive sexual behavior and, on the other hand, we can explore the biasing effect of certain factors on the report of condom use. This is because the manifest response to the question of condom use given by a man or woman may be a function not only of what the couple truly does but also of other factors that may induce individuals not to respond accurately to the interviewer.

Analyses of survey data frequently assume that the characteristics of the interviewer and the situation in which the interview takes place have no systematic impact on the likelihood that the respondent gives truthful answers. In reality, however, the survey situation may play an important role in the quality of the information obtained (Fowler, 1993), and this is particularly likely when the topics that are discussed are sensitive, controversial, and private (Huygens, Kajura, Seeley, & Barton, 1996). Miller et al. (2001, p. 170) argued that respondents give the answers that they think can benefit themselves or their community in the light of what they believe the interviewer's research aims to be. This explanation seems to assume an instrumental and conscious reaction by the respondent, and we consider instead the possibility that a respondent's beliefs about what the interviewer and the people like him or her expect shape the answer that is given. In other words, people provide a response about their behavior that is consistent with what they believe is socially desirable (Crowne & Marlowe, 1960; DeMaio, 1984; Gregson, Zhuwau, Ndlovu, & Nyamukapa, 2002; Kissinger et al., 1999; Phillips & Clancy, 1972). The formation of these beliefs is mainly derived from the comparison the respondent makes between the particular situation in which the interview takes place and previous experiences with similar characteristics that he or she remembers (Lamberts & Shanks, 1997). We therefore hypothesized that individuals who report that someone such as a community-based distribution agent, a traditional birth attendant, or a health surveillance assistant ever came to their home to give them information about how people can protect themselves against AIDS would tend to overreport condom use. These are all local workers who have been trained by the government or nongovernmental organizations for various purposes related to family planning, health promotion, and reproduction assistance. Huygens et al. reported the following about Uganda:

> Local farmers and teachers trained as interviewers in the programme were soon viewed as members

> of the pool of researchers known as ''doctor'' or ''virus'' in the community. . . . This attitude may influence the respondent to hide his or her own beliefs and behaviors in assuming that the interviewer is more educated or sophisticated. (p. 225)

Therefore, it makes sense to think that the respondents in the surveys we analyzed who have been informed about HIV/AIDS preventive practices by these local ''experts'' would be likely to associate that experience with the interview, in which they are asked by local interviewers about sexual behavior, AIDS, and condom use, among other things. It is clear that AIDS information from experts may also affect actual condom use, and in our analyses we sought to measure both the potential biasing effect on the report of condom use and the effect on condom use itself.

Method

Data

Our data came from the MDICP. The aim of this project was to examine the effect of social interactions on individuals' behavior and attitudes toward the use of modern contraceptive methods and HIV/AIDS in rural Malawi. The MDICP provided both qualitative and quantitative data. In this study, we made use of the latter, which consisted of a longitudinal household survey conducted in 1998, 2001, 2004, and 2006 in three rural districts, one in each of the three regions of the country: (a) Rumphi (north), (b) Mchinji (central), and (c) Balaka (south). A household list of residents in each randomly selected village was compiled, and a random sample of ever-married women age 15 through 49 was selected. Husbands of the currently married women were also included in the sample. The 1998 wave included approximately 1,500 ever-married women and 1,100 spouses of these women. In 2001, new spouses were added, and respondents who could not be located in 1998 were interviewed. In 2004, the sample increased with the addition of a random sample of adolescents, selected from household lists collected in the sampled villages during that year, to correct for the underrepresentation of young females due to aging, and it included nonmarried individuals. In 2006, the spouses of married adolescents also were interviewed. Although the sample was not designed to be nationally representative, the distributions of responses were quite similar to those of comparable questions among the rural population in the nationally representative Malawi Demographic and Health Survey (for more details, see Watkins, Behrman, Kohler, & Zulu, 2003). Refusal rates were remarkably low, thanks to notable efforts to follow up (Anglewicz, Adams, Obare, Kohler, & Watkins, 2009).

In this analysis, we used the data from the last two waves of the MDICP (2004 and 2006), given that these were the only ones that provided specific information about condom use inside marriage. Because one aim of this research was to show the importance of taking couples as units of analysis in the study of preventive sexual behavior, we limited the sample to individuals whose spouse had also been interviewed. Husbands and wives were interviewed separately, and in most cases they took the survey on the same day. We analyzed monogamous couples only because we could not know, in the case of polygamous families, to which of the current wives the man's responses about condom use inside marriage referred. Furthermore, women's evaluation of the HIV risk that unprotected marital sex involves would have been more complex in polygamous couples, possibly requiring a differently specified model. Men in polygamous marriages constituted less than 20% of both samples.

These restrictions reduced the samples to 643 and 627 couples in 2004 and 2006, respectively. We pooled the 2004 and 2006 data so that we could avoid working with small sets of cases. There was considerable overlap between the 2004 and 2006 samples, but they were not identical because some of the couples were not present in both waves. Missing data reduced the final sample sizes to 482 couples in 2004 and 546 in 2006, yielding a pooled set of 1,028 observations referring to 749 couples.

Our Approach: LCA

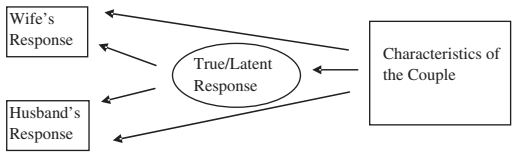
LCA is a technique analogous to factor analysis but intended for categorical measures. Given two categorical variables, A and B, among which there is a statistical association, an LCA would seek to construct a latent categorical variable, X, such that at each level of X (i.e., conditional on the value of X), A and B were independent (this is sometimes called *local independence*).

The expectation-maximization algorithm is most commonly used to estimate latent class models, treating the latent X as a missing variable in (in this example) a three-way cross-classification. This yields maximum likelihood estimates (see McCutcheon, 1987, for further details). We estimated the models using the LEM program (Vermunt, 1997). The adequacy of a latent class model is determined by how well the $A-B$ distribution implied by the model replicates the observed $A-B$ distribution (i.e., a goodness-of-fit test, usually the likelihood ratio chi-square, L^2, or the Bayesian Information Criterion). In an exploratory analysis, the number of categories of X—that is, the number of latent classes—is not known (although there must be at least two), and models with increasing numbers of classes are examined. In a confirmatory analysis, the number of latent classes is hypothesized at the outset, as in our case, where we fit a two-latent-class model in which the classes correspond, respectively, to the use and nonuse of condoms in marriage. In many LCAs, variables such as A and B are seen as error-ridden manifest indicators of a true latent X, and this is so in our case, where the manifest variables are the responses of the husband and wife about their condom use within marriage (two-category indicators) and the latent variable refers to the true condom use by the couple.

We can also add covariates or external variables to a latent class model with the goal of seeking to account for the true latent outcome. In our case we did this because we were interested not only in estimating true condom use but also in examining how this practice is related to characteristics of couples. The relations among all variables—external, manifest, and latent—are estimated simultaneously, and this yields a log-linear structural equation model with latent variables (Hagenaars, 1993). Although it is estimated simultaneously, the model can be thought of as having two parts: (a) a measurement model that links the latent unobserved true response concerning condom use in marriage to the manifest responses of the husband and wife to the question concerning condom use in marriage and (b) a structural model that estimates how characteristics of couples are related to true condom use (see Figure 1).

In addition, in the measurement model we allowed the relationship between the manifest and latent responses of the husband and wife to vary according to one factor that is expected to induce individuals to misreport condom use inside marriage, namely, whether they have ever been informed by experts about how to protect themselves against HIV infection. The estimation of the whole model thus enabled us to both understand the mechanism that explains true condom use and identify some of the reasons behind husband – wife discrepancies in reporting their preventive behavior.

FIGURE 1. MEASUREMENT AND STRUCTURAL MODEL.



Measures

The manifest variables were the husband's and wife's reports of condom use within marriage. Respondents were asked ''Did you ever use condoms with [your current spouse]?'' We used additional information to construct a dichotomous measure—*users* or *nonusers*—that more specifically referred to current condom use, given that the survey did not provide any information about the use of condoms in the last sexual intercourse with the spouse. When asked afterward about the frequency of use, one of the possible answers was ''At the beginning [of the relationship].'' Those who chose that option were considered *nonusers*, so that we could be more confident that the appropriate time order was established. The rest—namely, those who said ''sometimes,'' ''almost every time,'' and ''every time''—were coded as *users*.

The structural model included variables that measured couple characteristics, instead of individual features, so that the outcome variable—condom use by the couple—and the explanatory variables were measured at the same level of analysis. Note that the LCA requires all the variables in the model to be categorical.

One of the external variables in our models referred to the perception of HIV risk; more specifically, it measured the suspicion of infidelity in the couple. Respondents were asked ''Do you think your [husband/wife] had other sexual partners during the time you have been with [him/her]?'' The couple-level dummy

variable distinguished couples in which at least one of the spouses suspected from couples in which both spouses answered ''No'' or ''Don't know'' to that question.

Two other variables referred to the normative constraints considered here. The first was the proportion of the husband's network partners who were (or were suspected to be) unfaithful. We focused on reports of male infidelity in networks because we were unlikely to find as much variance in reports for women. This indicator was built from several items in the questionnaire. On the one hand, the husband was asked ''Has your best male married friend had sex with anyone other than his wife in the last year?'' On the other hand, the respondent also gave information about the sexual behavior of four of the people with whom he had talked informally about AIDS (the vast majority of whom were of the same sex as the respondent). He also was asked ''How many [men/women] other than [her/his spouse] do you think [each of the network partners] has slept with in the last year?'' We calculated a rate in which the denominator included all the married people in the communication network plus the best friend (if the latter was not one of the network partners) and in which the numerator included individuals who, according to the respondent, had been unfaithful. From this we derived a dichotomous variable that distinguished cases in which 50% or more of the network partners had had extramarital sex. A higher threshold, 60%, generated higher standard errors in the estimation of the parameters, and the results barely changed.

Second, we constructed a dichotomous indicator of the number of living children reported by the wife, with the goal of allowing us to distinguish couples who might have had an interest in stopping or spacing births from those who had no children. Because in 2004 very few married women had zero living children, or even one, the reference category is made up of couples with two or fewer children. This ensured that no category was too small for statistical inference. Indeed, one or two children represents a very small family size in the rural Malawian context, where the total fertility rate is 6.4 children per woman (MDHS, 2004).

We assessed whether respondents had been informed by experts about AIDS by using each individual's responses to the following question: ''Has someone like a [community-based distribution] agent, [traditional birth attendant], or a health surveillance assistant ever come to your home to give you information about how people can protect themselves against AIDS?'' Our indictor separated those who answered ''Yes'' from those who said ''No'' or ''Don't know.'' In this case, the two variables referred to an individual characteristic, because we were interested in estimating its biasing effect on the personal report of condom use within marriage.

The models included controls for location of residence and husband's and wife's level of education and age. Region was not included because its effect was expected to be mediated by the marriage/residence system and education, which were distributed differently in the three regions. As regards residence, both the husband and the wife were asked the following: ''After you and your spouse got married, where did you live? In your spouse's home or village, in your home or village, or somewhere else?'' We constructed a two-category indicator that distinguished couples who lived in the wife's home or village from the others. We used the woman's answer because there was a small number of discrepancies between the husbands' and wives' responses to this question. For the missing cases in 2006 (approximately 4%), we took the husband's report.

As regards education, the original survey question distinguished among *no school*, *primary level*, *secondary level*, and *higher*. Our indicator of husband's education distinguished couples in which the husband had a secondary level education or higher, and our measure of wife's education differentiated between those couples in which the wife had a primary level education or higher from those in which the wife had no schooling. We used this dichotomy because very few women had a secondary education or higher.

We included the age of both spouses, coded into three categories: (a) *15 – 30*, (b) *31 – 40*, and (c) *41 and older* for the husband and (a) *15 – 25*, (b) *26 – 35*, and (c) *36 or older* for the wife (the modal age difference between spouses in this population was 5 years).

Results

Table 1 show that, in the data we used, in both 2004 and 2006 the percentage of husbands who reported that they used condoms with their current spouse was higher than the same

Table 1. *Distribution of Condom Use Inside Marriage According to Wives and Husbands, and the Distribution of Discrepancies Between the Spouses (*n = *643 couples in 2004 and* n = *627 couples in 2006)*

	2004			2006		
Variables	Wives	Husbands	Couples	Wives	Husbands	Couples
Condom use with current spouse						
No	79.60	76.70		81.50	77.50	
Yes	10.10	16.30		17.70	21.50	
Missing	10.30	7.00		0.80	1.00	
Total	100.00	100.00		100.00	100.00	
Discrepancies on condom use within marriage						
Both say yes			5.10			7.20
Wife says yes, husband says no			4.70			10.40
Husband says yes, wife says no			9.30			13.90
Both say no			65.50			67.90
Missing			15.40			0.60
Total			100.00			100.00

Note: Descriptives are based on the total samples of monogamous married couples, including missing cases.

figure for wives. The difference in husbands' and wives' responses shown in Table 1 was statistically significant ($p < .0001$) in both years. These discrepancies could derive from a general tendency for men to give positive answers more often than women: Miller et al. (2001) also observed this pattern in the 1998 wave of the MDICP, although instead of condom use they analyzed several other issues, including ''having ever talked with the spouse about the risk of getting AIDS.''

In the ''Discrepancies on condom use within marriage'' category in Table 1, a case was considered ''missing'' if at least one of the spouses did not provide a valid answer. More than 15% of the couples were missing cases in the 2004 data, and this is because, in this year, people who reported that they had not had sex with their spouse in the last 12 months were not asked about condom use with their spouse. Nevertheless, in most of these missing couples the other spouse reported that he or she had had sex, so discrepancies were present even in these cases. In 2006, every individual had to answer the question about condom use, independent of whether the couple had sex in the last year (and the percentages of women and men who reported not having had sex in the last year were only approximately 2% in 2006). We eliminated all the missing cases from our subsequent analyses. We also tested a model that included the missing cases as a third category with the 2004 data, because sexual abstinence in marriage could itself be an HIV-preventive strategy. The model was rejected because the estimated coefficients had very large standard errors as a consequence of the small size of the category.

In both years, the percentage of couples whose members reported opposite answers was more than double the percentage of couples in which the husband and wife agreed that they used condoms. Thus, one should be cautious when selecting one's source of information about condom use inside marriage.

The distribution, by sample year, of the variables included in the analysis are shown in Table 2, and in Table 3 we report the maximum likelihood estimates of our loglinear structural equation model with latent variables applied to the pooled data from the 2004 and 2006 waves. We fitted two latent classes models that differed only in their specification of the measurement model. In the first, we estimated a model with a restricted measurement part in which the husband and wife's manifest responses were exclusively generated by the true latent variable (Model 1). In the second, we allowed the manifest responses of husband and wife to depend also on whether they had been informed about AIDS by experts (Model 2). Fitting these two different versions of the measurement model then allowed us to observe how the estimated effects of the explanatory variables on true condom use shifted when we took into account a factor that may induce women and men to misreport protected sex inside marriage.

Table 2. *Distribution of the Variables in the Analysis by Sample Year (*n = *482 couples in 2004 and* n = *546 couples in 2006)*

Variables	2004	2006
Wife reports having used condoms	11.62	17.40
Husband reports having used condoms	17.63	21.61
Wife has primary-level education or higher	69.92	66.85
Husband has secondary-level education or higher	16.39	13.37
Wife's age (ref.: 15–25 years)		
26–35	37.97	37.18
36+	40.04	45.05
Husband's age (ref.: 15–30 years)		
31–40	35.68	31.50
41+	45.85	51.10
Matrilocal residence	34.02	34.62
At least one spouse suspected of infidelity	36.93	23.99
More than two living children	77.59	76.74
At least half of the network partners had extramarital sex	13.90	18.50
Wife has been informed by experts about AIDS	25.73	49.08
Husband has been informed by experts about AIDS	31.33	49.27

Note: All table values are percentages.

The measurement model may be written as a logit model:

$$\text{logit}\left[\frac{Y_i = yes}{Y_i = no}\right] = \beta_{0s}[\eta = yes] + \beta_{1s}[X_i = yes], \qquad (1)$$

where i denotes individual observations and s denotes sex, Y is the manifest response to the condom use question (reported condom use in Table 3), and X is the variable measuring whether the individual has been informed by experts about AIDS. The latent response is denoted by η.

In the first version of the measurement model we set $\beta_{1s} = 0$ and thus focused only on the relationship between the latent and manifest responses. A chi-square test of the hypothesis that β_0 did not differ by sex could not be rejected, and so Model 1 reports a single coefficient. This result suggests that women's manifest responses were not more closely linked to the true response than were men's.

In the second version of the measurement model (Model 2 in Table 3) we estimated both β_0 and β_1, and both could be constrained to be the same for men and women, $\chi(2) = 0.77$. The β_1 coefficient was positive and statistically significant, indicating that having been informed by experts increased the odds of a positive manifest response by a factor of 2.3 times (=exp[0.848]). Under this model, we estimated a true rate of condom use of 24.7%, which was lower than the observed rate among couples (based on either the husband or wife answering affirmatively) of 27.7%. Among couples who reported having been informed by an expert, the reported use—30.7%—was markedly greater than the estimated true rate of 23.5%.

Turning to the structural model, which predicts the log odds of being in the *yes* category of the latent response, we noted that, as expected, the influence of education was positive and substantial. Couples in which the wife had attended school or the husband had a secondary education or higher were more likely to have used condoms. The probability of using condoms was lower when the husband was older than 40. The type of marriage and residence system had no statistically significant effect on condom use. Condom use was more frequent in 2006 than in 2004.

Turning to tests of the hypotheses discussed earlier, the perception of HIV risk derived from extramarital relations had a positive and significant effect on condom use, as expected. Furthermore, and also in line with our expectations, couples with no or few children were less likely to use condoms. We interpret this to mean that the use of condoms increases when couples are willing to use contraceptive methods for birth stopping or birth spacing purposes. This does not necessarily mean that the only reason they use condoms is for contraception: Couples may also be trying to avoid HIV/AIDS infection, but they are more likely to agree on condom use when it can be interpreted as a way of avoiding pregnancy.

Whether a high proportion of the husband's network partners were suspected of being unfaithful did not significantly influence the use of condoms by the couple. Thus, our hypothesis that the weakness of the fidelity norm facilitates condom use inside marriage by reducing the conflict between protected sex and formal sexual relations was not supported.

Table 3. *Latent Class Analysis of Condom Use Within Marriage, Pooled Data From 2004 and 2006 (*n = *1, 028 observations, 749 couples): Measurement and Structural Models*

Parameter Estimate	Model 1		Model 2	
	B	*SE B*[a]	*B*	*SE B*[a]
Measurement model				
Dependent variable: Reported condom use (wife/husband)				
Actual condom use (latent)	2.88***	0.28	2.94***	0.26
Informed by experts about AIDS (wife/husband)			0.85***	0.24
Structural model				
Dependent variable: Actual condom use (latent)				
Wife has primary education or higher	1.01*	0.45	1.04*	2.26
Husband has secondary education or higher	1.28**	0.40	1.20**	2.98
Wife's age (ref.: *15–25*)				
26–35	−0.70	0.44	−0.71	1.55
36+	−0.90	0.57	−1.07	1.78
Husband's age (ref.: *15–30*)				
31–40	0.17	0.43	0.19	0.43
41+	−1.11*	0.56	−1.00	1.76
Matrilocal residence	−0.36	0.36	−0.48	1.30
At least one spouse suspected of infidelity	0.84*	0.34	0.78*	2.28
More than two living children	0.80*	0.41	0.84*	2.03
At least half of the network partners have had extramarital sex	−0.09	0.39	−0.03	0.07
Wife informed by experts about AIDS	0.49	0.31	−0.02	0.05
Husband informed by experts about AIDS	0.07	0.31	−0.55	1.54
Year 2006	1.02**	0.34	0.99**	2.92
L^2	1,059.35		1,041.84	
BIC	−94,697.31		−94,707.88	
df	13,807		13,806	

Note: BIC = Bayesian Information Criterion.

[a]All standard errors are clustered at the couple level.

$^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Being informed by experts seems not to have made the respondents more likely to use condoms with their spouse (the coefficient of this variable in the structural model did not reach statistical significance) but instead induced them to give a positive answer to the survey question (the coefficient in the measurement model was highly significant). These results were not affected by a high degree of association between the husband's and wife's reports about having been informed by experts, because the correlation coefficient was very small in both waves.

A comparison of the results of the LCA with alternative models using the same set of explanatory variables is provided in the supplemental Appendix to this article, which can be found on the *Journal of Marriage and Family* web site (http://onlinelibrary.wiley.com/journal/10.1111/(ISSN)1741-3737). On the one hand, a model was estimated in which we took the reported condom use by one of the partners as the dependent variables. Our intention was to illustrate the advantages of using our approach, which removes the necessity of choosing one of the spouse's responses as the truthful one. On the other hand, we estimated a multinomial logit for the four possible combinations of the husband's and wife's responses, and our results showed that the latent class model that we propose is superior in terms of goodness of fit to the same data.

Discussion

Before summarizing our conclusions, we should point to some limitations of our analysis that future research might seek to address. These mostly stem from the fact that the link between

concepts and their indicators was sometimes not as close as we could wish. In particular, the question about condom use in marriage would have been better, for our purposes, had it focused on the most recent sexual intercourse. Similarly, we were forced to use the number of surviving children as a proxy for the couple's future fertility and family planning preferences when a direct measure would have been preferable. One consequence of such limitations is that they introduce error into our estimates, which is most likely to lead us to underestimate the strength of the relationships between condom use and the explanatory variables. The relatively small sample sizes available to us also imposes a limitation on our ability to discern effects that may have been more readily apparent with a larger sample.

Condom use is never a strictly individual outcome: Sexual behavior is affected by the context in which it takes place and by the attitudes and characteristics of the individuals involved, and the social norms that regulate different types of sexual relations are diverse. The advantages of the latent class approach become evident when we see that, in a more conventional analysis using the responses of only one spouse or the other, conclusions about the factors affecting condom use depend on whether we choose the male or female spouse's responses (see Table A1 in the online supplement to this article). The LCA also sheds light on why we observed discrepancies between the husband's and wife's responses about condom use. We are able to explore the factors that induce men and women to answer accurately or not in response to survey questions about their preventive behavior. There are obvious possibilities to apply this approach to other circumstances in which two or more respondents are asked factual questions about activities they have engaged in together.

One of the main objectives of this study was to test the hypothesis that condom use within marriage is in conflict with the most salient social norms that regulate marital relations in rural Malawi. Fidelity and reproduction are two of the fundamental elements that guide spouses' behavior, and they are hardly compatible with the use of condoms, which, our analysis showed, is usually motivated by the suspicion of unfaithfulness. Nonetheless, the pressure that social norms exert on individuals and couples might depend on the expectations that they have about the extent to which others follow the norms. Moreover, compliance with the norm that links marriage with reproduction is more evident as the number of children increases. Therefore, the use of condoms in marital relations should be less problematic as the family reaches an acceptable size, and our empirical analysis supported that argument. Nevertheless, we have not found evidence to support our proposition concerning the relevance of the perceptions of other people's compliance with the social norm of fidelity. This does not necessarily mean that condom use within marriage is not influenced by the norm of fidelity, but it does not support the hypothesis that empirical expectations about fidelity affect condom use, despite the norm being generally accepted. It could be that, even if people perceive that the norm is disobeyed by many others, the normative expectations might be so relevant that condom use for HIV-prevention purposes is very unlikely to have a place in marital sex. In this case, and given the relevance of the number of children to the couple's likelihood of using condoms, the best strategy for promoting condom use would be to emphasize its contraceptive, rather than its HIV-protective, function. The interpretation of condom use as a contraceptive method should help to diffuse this practice among married couples who are willing to stop or space births.

On the other hand, we have identified a factor that partially explains the deviations of the responses that women and men gave about condom use within marriage from the ''true'' couple preventive behavior. The individuals who reported that a local expert had ever been to their homes to inform them about AIDS preventive behavior were more prone to exaggerate, in their responses, their use of condoms within marriage. We suggest that, because respondents associated that experience and the interview, they reported a behavior they believed they were expected to have adopted (socially desirable). Our results should not be interpreted as evidence of the failure of prevention programs that spread AIDS information through the rural population, because they might have a positive effect on other preventive practices. One should be cautious, however, when evaluating the success of policy interventions and be sensitive to the bias that may be present when individuals report their own behavior.

Supporting Information

Additional supporting information may be found in the online version of this article:

Appendix: Couple Versus Individual Measures of Condom Use.

Please note: Wiley-Blackwell is not responsible for the content or functionality of any supporting materials supplied by the authors. Any queries (other than missing material) should be directed to the corresponding author for the article.

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