


---

**Study designs fail to represent the intricate effects of HIV testing and counselling on condom use and HIV transmission in sub-Saharan Africa**

From STÉPHANE HELLERINGER1,2* and GEORGES RENIERS3,4

1Mailman School of Public Health, Columbia University, New York, USA, 2Columbia Population Research Center, Columbia University, New York, USA, 3Office of Population Research and 4Department of Sociology, Princeton University, Princeton, USA

*Corresponding author. Mailman School of Public Health and Columbia Population Research Center, Columbia University, New York, USA. E-mail: sh2813@columbia.edu

Turner et al.1 present an engaging contribution to the rapidly expanding literature on changes in sexual behaviour following HIV testing and counselling (HTC) in generalized epidemics.2 By using a longitudinal study design with measurements of condom use and coital frequency before and after HTC, the authors improve on previous studies that document the association between HTC and condom use in cross-sectional surveys3 and on prospective studies that do not include a comparison of pre- and post-test behaviours.4,5

Despite these improvements, their analysis—as is the case for virtually all studies on this topic—still suffers from two related flaws. First, the authors treat behavioural change as a homogeneous process that is well described by statistical measures of central tendency (e.g. means and regression coefficients). Secondly, they assume that changes in condom use will translate into reduced HIV transmission in a predictable, linear manner. These assumptions are incorrect, and will distort our understanding of the behavioural responses to HTC, and ultimately also of the importance of HTC for HIV prevention.

Existing studies of behavioural change (here condom use) following HTC have tried to answer a simple question: on average, do individuals practice safer sexual behaviours after HTC? In doing so, they ignore—possibly large—heterogeneity in the response to HTC: after learning their HIV status, some will drastically reduce their risk behaviours; others will only marginally do so, and a third group may even increase risk taking. This could be because attitudes towards condom use and the sexual satisfaction it procures differ markedly across individuals, because some women may not be in a position to negotiate the use of condoms with their partner(s) or because the process of behavioural change itself may produce incentives for some to maintain or even adopt risky(ier) behaviours. For example, if some women adopt condom use following HTC, but the preferences of men for unprotected sex remain unaltered, then the demand for sexual relationships with the fewer women who still accept unprotected sex will increase. This may lead to behavioural disinhibition in order to meet the demand expressed by men.

In that context, statistical measures of central tendency (e.g. means or regression coefficients) are likely to be artefacts that mask the diversity of individual responses to HTC and hardly shed light on the actual social process of behavioural change. Tables 2, 3 and 4, for example, describe and model the conditional mean of the distributions of the total number of sex acts, unprotected or not. The standard deviations of these distributions are reported in Table 2 but they are not discussed and this summary index of dispersion only gives a crude picture of population-level heterogeneity.

---


Heterogeneity in behavioural responses to HTC is important because it can sustain an epidemic, even when the average level of risk is declining. It is well known, for example, that a few superspreaders can contribute disproportionately to the transmission of sexually transmitted infections. Turner et al. overlook this possibility and argue that because HIV-infected women in this cohort markedly reduced their number of unprotected acts, susceptible partners of HIV-infected women likely faced reduced HIV risk. This is not necessarily the case. The effects of HTC and behavioural change on HIV transmission depend non-linearly on changes in sexual mixing patterns and the resulting networks that connect members of that population. If some women indeed develop preferences for condom use following HTC, men who prefer unprotected sex may form new, riskier partnerships or eventually turn to commercial sex workers. This may increase the number of ‘bridges’ between core groups with high HIV prevalence and women in stable relationships, and possibly enhance the spread of HIV. In other words, the effects of HTC on HIV transmission are complex, and impossible to measure with individual centered study designs that compare condom use—or, more generally, behavioural adjustments—in testers and non-testers.

These difficulties are further compounded when individuals respond to HTC by adopting risk reducing measures beyond the ABC-type markers of behaviour change (abstinence, faithfulness and condom use). For example, after learning their HIV status, individuals may not only adopt condoms, but also purposefully seek partner(s) of seroconcordant status (a behaviour known as serosorting). In that context, the beneficial effects of HTC may be amplified because there are fewer serodiscordant relationships through which HIV may be transmitted. Others may divorce a spouse they consider likely to be infected with HIV. Such behavioural responses are rarely measured in surveys of sexual behaviours in sub-Saharan countries. Ignoring these interactions between the adoption of condom use or other ABC behaviours and the dynamics of partner choice will lead to biased estimates of the effects of HTC on behavioural change and HIV incidence.

In conclusion, assessments of the effects of HTC on condom use and HIV risk should account for (i) the dispersion parameters of empirical distributions of risk behaviours and (ii) the changes in sexual networks fostered by HTC. At a minimum, longitudinal studies should report the proportion of study subjects who reduced their risk behaviours by various magnitudes (e.g. reduced their number of unprotected sex acts by >20 vs 0–20%), as well the proportion of study subjects who have increased their risk behaviours following HTC. For continuous outcomes such as the number of unprotected sex acts, non-parametric relative distribution methods could be used to better describe changes in the distribution of risk behaviours. Furthermore, changes in sexual network structures resulting from changes in individual behaviours must be ascertained. These can be observed directly through tracing of sexual partners, or may possibly be inferred indirectly via the use of statistical models. Until such techniques are incorporated in future studies, we will fail to fully represent the intricate effects of HTC on condom use and, ultimately, HIV transmission in sub-Saharan Africa.

References