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## **Abstract**

Concerns about the impact of risk compensation on advances in biomedical human immunodeficiency virus (HIV) prevention technologies have been documented. We conducted an exploratory qualitative study using focus group discussions with young South African men and women (aged 18 to 24 years) to explore perceptions of risk compensation with regard to a hypothetical posttrial HIV vaccine. During the discussions, participants expressed their disquiet about the potential for risk compensation and the manner in which this might manifest among young people. Discussions specifically focused on reductions in condom use, an increase in multiple partners, and increased frequency of sex. The discussions also revealed contradictory feelings about HIV vaccines: appreciation for their development tempered by concerns about loss of control and undermining morality. Women were particularly concerned with the possibility of increased partner concurrency and infidelity. We suggest that concerns in HIV vaccine target populations about the impact of possible risk compensation be incorporated into strategies for vaccine introduction once vaccines move from the hypothetical to reality.

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## Perceptions of Sexual Risk Compensation Following Posttrial HIV Vaccine Uptake Among Young South Africans

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### Abstract

Concerns about the impact of risk compensation on advances in biomedical Human Immunodeficiency Virus (HIV) prevention technologies have been documented. We conducted an exploratory qualitative study using focus group discussions with young South African men and women (aged 18–24 years) to explore perceptions of risk compensation among young South Africans with regard to a hypothetical posttrial HIV vaccine. During the discussions participants expressed their disquiet about the potential for risk compensation and the manner in which this might manifest among young people. Discussions specifically focused on reductions in condom use, an increase in multiple partners and increased frequency of sex. The discussions also indicated contradictory feelings about HIV vaccines: appreciation for their development tempered by concerns about loss of control and undermining morality. Women were particularly concerned with the possibility of increased partner concurrency and infidelity. We suggest that concerns in HIV vaccine target populations about the impact of possible risk compensation be incorporated into strategies to for vaccine introduction once vaccines move from the hypothetical to reality.

### Keywords

Adolescents/youth; Africa; South; behavior change; focus groups; HIV/AIDS prevention; immunization; risk; perceptions

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With current estimates suggesting that 33 million people are currently living with HIV globally and that 2.7 million new HIV infections occur annually (United Nations Program on AIDS, 2008), the need for effective HIV prevention tools and strategies remains a priority. However, the efficacy of condoms and circumcision, as well as developments in post-exposure prophylaxis (PEP), pre-exposure prophylaxis (PrEP), microbicides and HIV vaccines might all be negated should risk compensation substantially alter the manner in which people behave when using HIV prevention technologies (Padian, Buve, Balkus, Serwadda, & Cates, 2008). Risk compensation refers to an increase in unsafe behaviors in response to perceptions of decreased risk caused by the introduction of a preventive or treatment intervention (Hogben & Liddon, 2008) and is a common concern in the public health field. Risk compensation has been associated with a range of behaviors, including the

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#### Declaration of Conflicting Interests

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impact of seatbelt wearing on reckless driving and the use of sunscreen with regard to sun exposure (Autier et al., 1998; Richens, Imrte, & Copas, 2000).

It is however in the context of HIV prevention that concerns about the negative consequences of risk compensation have been most recently raised. Concerns about risk compensation associated with HIV prevention technologies have been justified in results from modeling studies (Gray et al., 2007; Pinkerton, 2001; Visser, Nagelkerke, Habbema, & de Vlas, 2008). Such concerns are not misplaced, given that an association between risk compensation and HIV treatment has been clearly demonstrated. A meta-analysis of HIV treatment and risk behavior showed an increase in unprotected sex associated with Highly Active Antiretroviral Treatment (HAART) because of beliefs that reduced plasma viral load is predictive of lower risk of transmission (Crepaz, Hart, & Marks, 2004). Studies particularly focused on men who have sex with men in developed countries have noted the insidious impact of treatment optimism on safe sex practices (Huebner, Rebchook, & Kegeles, 2004; Lert, 2000; Sullivan, Drake, & Sanchez, 2007), although such challenges seem not to be as pervasive in the general population of less developed countries (Bechange et al., 2010; Eisele et al., 2009).

There is mixed evidence of increased sexual risk behaviors from clinical trials and observational studies of HIV prevention technologies. It has been suggested that risk compensation might explain the limited effects of condom promotion in countries with generalized epidemics as compared to those with epidemics concentrated in the sex work industry (Cassel, Halperin, Shelton, & Stanton, 2006), although fears of “condom migration” have generally been found to be misplaced (Foss, Vickerman, Heise, & Watts, 2003; Posner, van der Straten, Kang, Padian, & Chipato, 2005). Observational studies of male circumcision have indicated no increase in unsafe sexual behaviors (Agot et al., 2007) and data from two of the three clinical trials of circumcision have shown no changes in sexual behavior that might indicate risk compensation (Bailey et al., 2007; Gray et al., 2007; Mattson et al., 2008). The South African trial, however, found that circumcised men reported more risk behaviors than their uncircumcised contemporaries, although only number of sexual contacts was significant: months 4–12 circumcised men reported 5.9 contacts compared to 5.0 among uncircumcised men ( $p < 0.001$ ) and months 13–21 circumcised men reported 7.5 contacts versus 6.4 for uncircumcised men (Auvert et al., 2005). The degree to which this change might increase HIV acquisition and increase over time is unknown. There are limited studies of risk compensation following the use of PrEP, PEP and microbicides; few have demonstrated an increase in risk behaviors associated with their use (Abdool Karim et al., 2010; Eaton & Kalichman, 2008; Grant et al., 2010; Guest et al., 2007; Guest et al., 2008; Korner, Hendry, & Kippax, 2006; Martin et al., 2004).

There is, therefore, currently limited empirical evidence of risk compensation as a consequence of new HIV prevention technologies (Eaton & Kalichman, 2008) because clinical trials of new technologies have rarely detected statistically significant levels of risk compensation among participants; and even less is known about levels and impacts of risk compensation in broader communities in which HIV prevention technologies are made available. Qualitative research explaining risk compensation is almost completely missing from the literature.

The burden of HIV-infection is high among South African youth, with 15.5% of women and 4.8% of men age 15–24 years infected (Pettifor et al., 2005). Given such high prevalence of disease, young South Africans are a likely constituency for the dissemination of HIV vaccines once they have been tested for efficacy and approved for use. Barriers and motivators to hypothetical HIV vaccine uptake using data from focus group discussions (FGDs) with young South Africans have been discussed elsewhere (Sayles, MacPhail,

Newman, & Cunningham, 2010). In this article we use an exploratory qualitative study design for investigation of the perceptions of risk compensation among young South Africans with regard to a hypothetical posttrial HIV vaccine.

## Methods

### Sampling

We recruited participants from an inner-city public sector clinic. The clinic serves a high-risk urban population characterized by poverty, high levels of mobility and large numbers of immigrants from other African countries. A purposive sample (in terms of gender and age breakdown) of young men and women aged 18–24 years was recruited through flyers distributed in the clinic and word of mouth by health care providers to participate in focus group discussions on posttrial HIV vaccine acceptability. Our participants were generally strangers to one another rather than members of common friendship networks. We selected this population for the discussions as, being South African youth, they are at risk of HIV infection (Pettifor et al., 2005) and, as consumers of public sector health services, would be likely to benefit from the introduction of a HIV vaccine.

### Participants

We included young men and women in the study if they were: (a) aged 18–24 years; (b) fluent in either of two dominant local African languages spoken in the study site and; (c) able and willing to provide informed consent. We reimbursed participants ZAR30.00 (approximately US\$6 at the time of data collection) for their participation in the study. The study protocol and data collection instruments were reviewed and approved by the University of the Witwatersrand Human Research Ethics Committee and the Institutional Review Board of the University of California, Los Angeles.

### Data Collection

We selected an exploratory qualitative study design to allow us opportunity to approach the topic broadly, given that there is little existing knowledge on this topic. We chose to explore posttrial HIV vaccine acceptability through FGDs because this method allows for expression of views within the broader social context from which the participants come and for opinions about products. This group experience replicates the experience study participants might have in decision-making around this topic outside of the research setting and is therefore more useful than the collection of individual perceptions might be (Krueger & Casey, 2000). A total of 6 FGDs were held with women and men. Four FGDs were held with women (participants n=6; n=6; n=6; n=7) and two with men (participants n=7; n=10); we purposively conducted more FGDs with women to reflect the greater risk of HIV infection to young women in this setting. This number represents the total FGDs that we aimed for at the beginning of data collection, although we had originally planned for up to 12 participants in each FGD. Scheduling conflicts made such numbers difficult for us to achieve. We achieved data saturation; as expected with a sample of this size (Krueger, 1994; Morgan, 1997). Our data was collected using a semi-structured topic guide that addressed the key issues around vaccine acceptability. After some discussion of vaccines in general, we asked participants questions relating specifically to HIV vaccines, as illustrated below:

- What have you heard about vaccines for HIV/AIDS?
- What are the reasons that you or your close friends would want to be vaccinated against HIV/AIDS?
- What are the reasons that you or your close friends would not want to be vaccinated against HIV/AIDS?

- How would being vaccinated change your or your close friends' sexual behavior?

Participants were asked to discuss their own views and their perceptions of the views of others in their communities, both to get a range of responses but also to protect confidentiality of those not wishing to disclose their own potential behaviors. Before the discussion we made it clear to all participants that an effective HIV vaccine has yet to be developed and that they would not be vaccinated as part of their study participation.

We conducted focus groups in isiZulu, seTswana and English. Recognizing the role of the facilitator in the data collection, we selected a young African woman fluent in all three languages to moderate the discussion in the belief that her age, gender and race would counter the educational distance between herself and the discussion participants. This focus on reflexivity has been noted as vital in other qualitative data collection using FGDs (Mkandawire-Valhmu & Stevens, 2010; Underwood, Satherthwaite, & Bartlett, 2010). The moderator was assisted by a note taker. We originally developed the topic guide in English and reviewed it extensively with the focus group facilitator to ensure that the correct meaning would be generated in African language discussions. We addressed all ambiguities and inconsistencies prior to beginning the data collection. At the start of each discussion group participants provided written informed consent for participation and at the end of the discussion groups they completed individual short socio-demographic surveys with the assistance of the facilitator.

## Data Analysis

We recorded FGDs with the permission of participants and then independently translated and transcribed in one step into English. Transcription was conducted by an outsider to the research process and no personal identifiers were provided to her to protect the participants' confidentiality. The group facilitator checked the transcripts for completeness and correct meaning. We allocated participant codes during the transcription process to ensure that comments could be attributed to specific individuals. Two principal investigators (MacPhail and Sayles) read the transcripts to identify major themes. Thereafter, we used a framework analysis approach to allocate each line of text to a specific code (Pope, Ziebland, & Mays, 2000). Codes were grouped according to theme and reviewed again. We assessed inter-coder reliability for a random 10% of the text, and the Kappa statistic was calculated to be 0.90.

We continued with analysis as an iterative process through discussion and refining of the major themes emerging from the transcripts. During this process we broke the data down into additional sub-themes using a process of constant comparison (Strauss & Corbin, 1990). We used data source triangulation (comparing data across focus groups as well as between men's and women's groups), as well as collaboration (patients and staff from the clinic provided input on wording and orientation of study questions as well as feedback on themes found in interpretative analysis), researcher reflexivity (interpretative commentary considers researcher's lens/point of view), and rich description to enhance the validity and reliability of the findings (Creswell & Miller, 2000; Lincoln & Guba, 1985; Rudy et al., 2005)

## Results

Participants ranged between 18–26 years of age, with 17/42 reporting that they were full-time students. Fourteen of the 42 participants reported being employed. Overall, 12/42 participants reported some or no high school education. The majority of participants were not married (40/42) with just more than half reporting a single sexual partner in the past 3 months and almost two-thirds of these reporting using a condom at last intercourse. Two-thirds reported having previously had an HIV test. Additional details on background characteristics are provided elsewhere (Sayles et al., 2010).

## Behavioral consequences of risk compensation

There was much discussion in all six focus groups of the potential for behavioral risk compensation following HIV vaccination in answer to specific probes about behavior change after vaccination. In voicing their opinions that risk compensation might be an unintended consequence of HIV vaccination, participants highlighted some ambiguous feelings toward HIV vaccines. A male participant highlighted this particularly well when he noted:

I'm saying that we need a vaccine so far because people are dying, err ... we are finished. But we need to turn around to see ... we are going to have to educate ourselves because it is easy to abuse this vaccine.

Table 1 presents themes around risk compensation as discussed in the 6 FGDs. The themes are ranked from the most commonly cited to less frequently discussed. Although all issues were not discussed in every discussion group, there was only a single instance in which a theme was not discussed by one gender: cheating within sexual relationships as a consequence of HIV vaccination was not discussed in either of the men's FGDs.

The most commonly postulated risk compensation raised by FGD participants was that the availability of a vaccine would result in a decline in condom use. A female participant noted: "Yah, I think few people will use condoms. If there's no need for me like for prevention of AIDS, then there's no need for condoms." Arguments that there would be a decline in condom use were made in the context of a general dislike of condoms as illustrated by the comment below from a female participant.

I think people would enjoy sex without condoms, because now many do not enjoy with a condom. Even now people still dare to not use condoms because they get pregnant, so most people will be relieved by then.

Not all participants thought that vaccine availability would result in reduced condom use. A single participant noted that her impression of reduced condom use once a vaccine is available would be moderated by the efficacy of the vaccine. Her expectation was that risk compensation through reduced condom use would only increase if vaccine efficacy was over 95%. "... it will depend on how effective the vaccine is but if it is maybe 95% more, I will use less but if it is less than 95%."

This participant was, however, highly unusual in that she had some understanding of partial efficacy. For the most part participants did not raise this issue during discussions and most conversations implied that participants assumed that a vaccine would provide full protection against HIV infection. This issue of complete protection was additionally discussed in terms of participants' concerns that HIV vaccine availability would also result in an increase in multiple partnerships or in sexual activity more generally. In contrast to those concerned with a vaccine reducing the use of condoms, one participant argued that condoms are known to be fallible and that uncertainty over condom efficacy constrains sexual behavior. In contrast, she implied that an HIV vaccine would be completely protective and that this would encourage sexual promiscuity.

Okay! You know what, you know how people are, right? Not everyone will be like, you know, they support the vaccine, no. People will take advantage, they will sleep around because there are vaccines, you know what I'm saying? You understand? People will think if there are AIDS vaccines they can just be promiscuous, and not care. This thing is going to destroy people's minds. They won't wake up to say 'by the way there is a condom'. A condom is right but you know sometimes it can break. But vaccines will encourage people to be promiscuous, some might sleep

with four partners in one night, because they know ‘there is a vaccine, I won’t get I won’t get sick’, you understand what I’m saying?

In the instances where participants discussed the balance of potential behavior change, their impression was that forgoing condoms after vaccination would be more likely than adopting multiple sex partners. In response to a question about whether a decline in condom use or increase in multiple partners was more likely, a female participant noted: “I think it wouldn’t change their behavior [in terms of multiple partners]. You are what you are. No matter if the condom is available, you can sleep without a condom

However, after concerns about reduced condom use, participants were most likely to express concerns related to increases in number of sexual partners. A female participant noted that “People will be sleeping around telling themselves ‘I’m vaccinated, so why should I care.’” Participants expressed concerns about an increase in the total number of sex acts after vaccination, but such concerns were not easily separated from those of multiple partners, as illustrated by the two quotes below.

But then let’s say I come from a family where I lost someone from HIV, and then I’ve seen what it does, but now I know that even if I go around that would not happen to me. It would make the youth like have sex more ... with different partners, if I do this with him, and him and him it would not matter. So we would just do it.

Okay yes. I’m talking about the community I come from, it’s gonna be worst for them because they don’t mind to sleep with plenty of men. What if you want to sleep with plenty of girls, what must you do? I mean it’s an opportunity for you. There are those who stick to one partner, those who don’t date at all and they wish they were dating. So when we come across such an opportunity we use it. It comes once in a life time, you forget about the diseases. (laughter)

In all discussions of the manner in which risk compensation might manifest, participants emphasized their concerns in relation to the sexual behavior of youth. A male participant noted that this concern would be shared by communities and particularly emphasized that a HIV vaccine might lead to increased teenage pregnancies. Pregnancy, particularly among teenagers, was a concern across three discussion groups (2 women’s and 1 men’s groups) and was raised most frequently after concerns about condom use, increased sexual activity and an increase in multiple partners.

There will be concerns in my community, especially from the parents, if that HIV vaccine thing can be available. The youth rape cases will escalate and the youth will take advantage of making babies and like leave school at a young age. Things like that. Teenage pregnancy will increase.

Trepidation about increased pregnancy led many in the discussion groups to suggest that the HIV vaccine would be most effective if it was combined with pregnancy prevention. Thus, increases in sexual activity and declines in condom use would not result in unwanted children, particularly among adolescents.

So if vaccine becomes available can it prevent HIV only or maybe pregnancy as well? I think maybe it would make a difference on what it can really prevent, HIV and pregnancy or HIV only. If it would prevent HIV only, I think it will make things worse; it would be make things worse for people. It would be easier for them to have sex. If the vaccine doesn’t prevent pregnancy, people who are gonna get it, they are very scarce ...

Concerns for the impact of vaccines on youth were very strongly felt. Indeed, in one of the women’s discussion groups a participant was so concerned with the potential impact of risk

compensation on young people that she made the recommendation that HIV vaccines be withheld from people under 18 years of age. She ended this recommendation by stating that:

I know that these kids are the ones who are affected, but my point is, the more they feel they can get away with it is the more they become promiscuous. They shouldn't get the medicine. The government should design a policy to punish them like in my country, Zimbabwe.

Although other participants in the discussion group did not agree with this particular recommendation, this quote reflects a common theme in the discussion groups: the need for a moral code to guide responsible sexual behavior, trust, respect, and discipline in the context of an effective HIV vaccine.

### **Punishment, discipline and morality**

In discussion of risk compensation as a potential negative consequence of HIV vaccine availability, participants argued that fear of HIV infection acts to reign in unsafe sexual behavior. This context is exemplified by a comment from one of the male participants in which he noted "If you observe carefully, the HIV frightens some not to be free. When there is a vaccine they will be free." Participants spoke of a fear of HIV "controlling" behavior and "pushing" people into faithful relationships, as illustrated by a female participant who stated "If the vaccine is available there will be no trust at all in relationships because there will be nothing harsh to push people into faithful behavior."

Furthermore, the discussions had a strong focus on notions of sexual responsibility, discipline, morality and respect, particularly with regard to limiting unfaithfulness in sexual relationships. Participants emphasized the importance of "discipline" once a vaccine was available, as described by a female participant: "I would like to encourage people to stay disciplined and to respect themselves even when the vaccine is available. They must not think they can do whatever they want." Another participant linked this issue to the notion of "control" in his discussion of the role that risk compensation might play in increasing transactional sex. In South Africa transactional sex dominates community-level discussion of HIV transmission and his comment below explains that men might believe that they can capitalize on their wealth to attract multiple sex partners without having to fear HIV infection.

My fear would be self-control for certain people, or self-discipline. If, for example, I am rich, I have money and there's a vaccine, well with the materialistic type of world we are having, everyone wants a car, a house, a credit card to buy the expensive Prado [luxury 4x4 vehicle]. So if I am able to provide her with that and I'm able to get a vaccine to stop me from HIV, I can have about twenty girlfriends and know that 'Hey, I'm immune to HIV because I have money.'

Some of the discussion groups specifically highlighted the need for ongoing prevention counseling or intervention to be phased into vaccine delivery. This argument was made specifically with regard to maintaining moral behaviors and respect for oneself and sexual partners. A female participant noted: "I think counselors, they will have to wait like when you, you go for your medication [vaccine] ... after that they'll have to counsel you. Or maybe you go to a counselor after a month or ... I don't know. So that they can teach you how to behave and all those things." Such sentiments were echoed by other participants who argued for "control" in the form of personal responsibility to be part of education messages associated with HIV vaccines.

The vaccine is important but control still needs to be emphasized together with the vaccine. The vaccine shouldn't go alone as 'Hey, here's the vaccine that can prevent HIV.' It should go with other messages that are already there on HIV.

Another participant suggested that education messages about the vaccine should misrepresent vaccine efficacy as lower than it actually is, particularly if efficacy approached 100%. It was suggested that this might dissuade those accessing the vaccine from adopting unsafe sexual behaviors. Other suggestions included informing the public that the vaccine was only effective protection with up to five sexual partners. Thereafter, the vaccine no longer offers protection. In keeping with the concern for morality and respect, another participant offered the opinion that vaccine delivery should be tied to discussions of morality when she stated: “We should tell them ... we should talk a lot about morals. Morals. It should be a moral issue now.”

### Othering of risk compensation

Despite commonly expressed concerns about the impact of HIV vaccines on adolescent sexual behavior, few participants acknowledged that they would increase their own sexual risk behavior following HIV vaccination. This is exemplified in one of the discussion groups with young women in which the facilitator redirected a general discussion about increases in multiple partners to specifically ask participants whether they would have multiple partners after vaccination. Most participants said that they would not, with one young woman explicitly stating “No I am not talking for myself here. Don’t get the wrong idea! I am not that type.” Such thoughts were taken up by other participants in the group, such as the participant who noted:

I will continue to live my life, like, I was living it before. That won’t change me. If I was sleeping around I would do that. If I wasn’t, then I continue like that.

In such discussions it was common for participants to highlight their belief that they are the products of their families and culture and that access to an HIV vaccine would not change beliefs and values instilled in them from childhood.

I think, ... it’s not always good to generalize you know. I for one I will not sleep around because that vaccine is there, you know. I’m still a man, I still respect my manhood. I’m a responsible man you know, I believe in having one partner ... so I’m saying I will get it, the vaccine, but it won’t influence me doing things that I was not supposed to do.

There were only three participants (one man and two women) who argued against risk compensation concerns. One female participant argued that fear of pregnancy would ensure that young South Africans continued to use condoms despite the availability of an HIV vaccine. She argued that “I think err, I think, I think less of people would stop using condoms ‘cause if the vaccine thing is like available. So they’ll be using condoms to prevent pregnancy and no longer preventing HIV/AIDS.” A second female participant disputed the fact that vaccine availability would increase cheating within relationships. In the men’s discussion groups a single participant noted that discussions of risk compensation remove individual power. He argued against the inevitability of risk compensation and was vehement that individuals are capable of rational thought concerning their actions.

I think thoughts like that ... that saying humans cannot have control ... it’s like a thought that says men cannot control his penis ... are very dangerous in society because, what they do, they make us give in to our own lawlessness, our own silliness and naughtiness. It doesn’t give us power. It takes power away from us because it says ‘You can’t do this.’ If I start saying ‘Well you can’t control something’ then I take that power away from you. Then you really can’t control it because you already believe that you can’t. But if you tell yourself ‘I can control this’, then you can control it.

## Discussion

Measurement of risk compensations associated with HIV vaccines is limited. Hypothetical vaccine studies have noted increased risk behavior as a result of risk compensation (Crosby, DiClemente, Wingood, Lang, & Harrington, 2003), particularly where there are assumptions of 100% efficacy and cross-clade protection (Newman, Duan, Rudy, Roberts, & Swendeman, 2004; Webb, Zimet, Mays, & Fortenberry, 1999). A placebo-controlled HIV vaccine study with men and women in the US found increased unprotected anal intercourse with higher risk behaviors among those who hoped that the HIV vaccine protected them against HIV infection (Chesney, Chambers, & Kahn, 1997). In contrast, the AIDS VAX trial in Thailand noted a reduction in intravenous drug-use and needle sharing along with increased condom use among 2545 participants at 12 months follow-up (van Griensven et al., 2004). South African adolescent participants in this study, as in other populations (Newman & Logie, 2010; Newman, Woodford, & Logie, 2011; Rudy et al., 2005), were not completely positive about the future potential of posttrial HIV vaccine availability and felt that concerns about risk compensation might act as a barrier to vaccine acceptability (Sayles et al., 2010).

Participants discussed a range of ways in which risk compensation might be enacted by vaccinated individuals but often "othered" their responses and disengaged themselves from their responses. Their most common fears were that vaccine availability would discourage condom use, increase multiple partnerships and increase the amount of sexual activity occurring. Participants were particularly concerned with risk compensation occurring among adolescents, and had specific concerns about how risk compensation associated with an HIV vaccine might increase teenage pregnancy.

Most behavioral consequences of HIV vaccination were mentioned by both men and women, but an increase in partner cheating was raised only in women's groups. Infidelity is a common concern among South African women (MacPhail et al., 2009); and among men to a lesser degree (Ragnarsson, Townsend, Thorson, Chopra, & Ekstrom, 2009). Data from South African adolescents shows that women's concerns about partner infidelity are not completely misplaced: a study of 15–24 year old adolescents in KwaZulu-Natal indicated that 40% of women believed their partners to have other partners, whereas 38% of men reported concurrency (Harrison, Cleland, & Frohlich, 2008). Although trust is frequently cited as an important component of long-term relationships and the rationale for unprotected sex, in reality couples are often in an uneasy position of uncertainty with regard to their partner's faithfulness. Whereas welcoming the advances in HIV prevention that a potential HIV vaccine might bring, women in this study were wary of the greater relationship insecurity that might accompany vaccine programs.

Comments from both men and women reflect attempts to balance a desire and appreciation for HIV prevention technologies with fears of potential changes to social and sexual norms. This uncertainty is suggested in participant discussions of HIV as a punishment that reinforces morality or constrains sexual behavior and the need for interventions enforcing sexual morals to parallel vaccination programs. Much has been written about HIV infection as punishment for immoral behavior (Kopelman, 2002) but less has been written on the converse: that a fear of punishment through HIV infection might actually serve to limit unsafe sexual behaviors. The removal of HIV infection fears and perceived increases in risk compensation might temper enthusiasm for new HIV prevention technologies and limit their uptake in South Africa and other countries.

Focus group participants, bar one, were largely unsure of the issue of partial efficacy and were unable to discuss this issue in any depth. However, it was often implied that they

assumed 100% efficacy and based their comments about people abandoning condom use on this assumption. The issue of partial efficacy is particularly important for assessing risk compensation because few new HIV prevention methods are expected to approach anything near 100% efficacy. Modeling studies suggest that low efficacy and low coverage vaccines will be most vulnerable to risk compensation (Stover, Garnett, Seitz, & Forsythe, 2002). Low acceptability of hypothetical low efficacy vaccines (Newman et al., 2006; Newman et al., 2004) might therefore result in greater impact of risk compensation. Careful education about this issue would need to be provided during HIV prevention vaccine campaigns, as well as during provision of other prevention methods.

Although risk compensation was a concern for these young South Africans, few equated their concerns with their own potential for negative behavior change. Risk compensation was discussed predominately as something that would happen to "others"; these others being people in the general community, young people and friends. "Othering" is often achieved through emphasizing difference of demographic characteristics such as race, gender, culture and ethnicity (Mankayi, 2009; Petros, Airhihenbuwa, Simbayi, Ramlagan, & Brown, 2006), and in this case might be a reflection of the data collection methodology: young people were likely not completely comfortable with discussing their own behaviors in a FGD setting. Participants did, however, emphasize the particular vulnerability of their age cohort. HIV has been particularly represented in South Africa as a youth problem by scientists and in the media and this is reflected in the discussions among these participants. At the time of the focus group discussions, concerns about teenage pregnancy were dominating local media, which might explain participants' particular concern with this issue. It is possible that "othering" was emphasized in this study given that the discussion was hypothetical and that the FGD format does not encourage self-reflection. These discussions did not, however, elicit information on the basis by which young people sought to differentiate themselves from others and additional elaboration of this issue with regard to risk compensation is warranted.

## Study Limitations

We acknowledge that there are limitations to the data used in this article. We collected data in this study through focus group discussions which might have allowed for overrepresentation of some research participants who might have dominated the conversation and influenced the overall dynamics of the groups. We made attempts to account for this through ensuring that all comments in transcripts were accountable to individuals for tracking and by using a facilitator skilled in managing group dynamics. The information might also have been influenced by the decision to conduct single gender FGDs; although we did this to increase participant comfort with a potentially difficult and sensitive topic. We did not use a formal translation and back translation process for the topic guide given that FGDs should be reflexive and not dependent on formally structured questions. This might have resulted in errors in interpretation that we did not identify, although attempts were made to limit this through in-depth discussion of the FGD topic guide with the facilitator, specifically examining the language to be used. Small sample size and purposive sampling are characteristics of qualitative research and our results presented here are therefore not likely to be generalizable to all South African adolescents. Specifically, our sample might over represent individuals making use of biomedical health care facilities, given that recruitment was clinic based, and might under represent adolescents with more limited educational attainment. Finally, discussions of the impact of risk compensation on personal behaviors might be under represented for three reasons: i) the vaccine under discussion is hypothetical and participants might have different reactions to a real vaccine, ii) the FGD format does not encourage self-reflection in the same manner that an individual interview might and iii) social desirability bias might limit the extent to which individuals in

the group are prepared to admit to their own HIV risk behaviors. Despite these limitations, we believe that we gained important new information about the challenges of risk compensation in populations likely to receive HIV vaccinations in the future.

## Conclusions

Despite ongoing technological advances in HIV prevention, behavior remains central to successfully combating this disease. Behavior change will be required for the adoption of new prevention or treatment methods; maintaining existing behaviors will be vital in offsetting partial efficacy of HIV prevention technologies; and such change will be required for sustained use of multiple prevention methods. Greater effort is therefore required to ensure that understanding of risk compensation is enhanced and that interventions specifically address the potential for risk compensation to negatively impact on technological advances. Suggestions to combat the potential for risk compensation include approaching sexual behavior as a balance between risks and rewards, rather than focusing on risk behaviors as the actions of the misinformed (Richens et al., 2000) as well as continued counseling on maintaining safe sex behaviors through multiple prevention method combinations. This suggests that efforts to combat risk compensation will have to take into account the specifics of individual choices and desires. Such a view enhances the need for a range of HIV prevention options and strategies (Cohen, 2005).

The data presented here also suggests that caution should be applied to the presumption that advances in biomedical HIV prevention technologies will always be viewed as positive by target communities and populations. Concerns about the moral and behavioral consequences of HIV vaccine availability were certainly prevalent among this sample of young South Africans. Although empirical evidence of risk compensation associated with HIV vaccination might not be substantial, perceptions of risk compensation in populations targeted for HIV vaccination should not be overlooked. Such perceptions might have significant impact on vaccine uptake and, outside of controls imposed by clinical trials, might be more prevalent than current evidence suggests. Concerns in HIV vaccine target populations about the impact of possible risk compensation should be incorporated into strategies for vaccine introduction once vaccines move from the hypothetical to reality.

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**Table 1**  
 Risk Compensation Topics Generated in Focus Group Discussions in Descending Order of Mention

Behavioral impact	Female groups			Male groups		
	FGD1	FGD2	FGD3	FGD4	FGD5	FGD6
Reduction in condom use	-	X	X	X	X	-
Increase in multiple partners	-	X	-	X	X	X
Increase in sexual activity	-	X	X	X	X	X
Negative impact on youth	X	-	X	X	X	X
Increase in pregnancy	-	-	X	X	X	-
Loss of fear of HIV/STIs	X	-	X	-	X	-
Need for discipline/respect	X	X	X	-	-	X
Increase in cheating	X	-	X	-	-	-
Morality	X	-	X	-	-	X