Qualitative Consumer Research on Acceptance of Long-Acting Pre-Exposure Prophylaxis Products Among Men Having Sex with Men and Medical Practitioners in the United States

Bobby J. Calder,¹ Robert J. Schieffer,¹ Ewa Bryndza Tfaity,² Richard D'Aquila,³ George J. Greene,⁴ Alex Carballo-Díéguez,⁵ Rebecca Giguere,⁵ Patrick F. Kiser,⁶ and Thomas J. Hope²

Abstract

Pre-exposure prophylaxis (PrEP) with oral Truvada® prevents HIV infection. However, the adherence to pill taking required for efficacy has sparked interest in developing new antiretroviral delivery systems that decrease such demands. Long-acting formulations, such as injections and implants, represent promising options that require less frequent adherence. It is important, however, that development of these new modalities be driven by understanding of the value seen in them by target users to maximize their uptake. To identify the key product features that impact user acceptance, we used a three-phase marketing research approach. In this study, we describe the results of the first-phase, qualitative focus group research performed in Chicago and San Francisco that explored subjective perceptions of oral versus alternative PrEP modalities among men having sex with men (MSM) and medical practitioners caring for MSM. Data revealed that potential value in long-acting PrEP lies more in simplifying the lives of users rather than in making them more confident in their adherence. The results provide an important guidance for designing and promoting these future long-acting products to enhance their contribution to increasing the current limited uptake of PrEP that will better stem the HIV epidemic.

Keywords: HIV prevention, MSM, PrEP, adherence

Introduction

PRE-EXPOSURE PROPHYLAXIS (PrEP) with oral emtricitabine and tenofovir disoproxil fumarate (FTC/TDF or Truvada®) is a proven strategy to prevent HIV infection in individuals at high risk, including men having sex with men (MSM).^{1–3} Several clinical trials found that efficacy of Truvada in preventing HIV acquisition among MSM was strongly associated with adherence to daily pill taking.⁴ Less frequent, “on-demand” use of Truvada is now also recommended,⁵ but this strategy has different adherence challenges, requiring consistent use before and after condomless sex.^{6,7}

Long-acting formulations for sustained PrEP delivery, such as injections or implants, represent a promising alternative to oral PrEP.^{8,9} By providing systemic protection for months, instead of days, these PrEP modalities decrease the frequency of adherence demands on the users.^{10,11–14} Thus, they have potential to become an important public health tool to further decrease the rate of HIV transmission, if they are used by many who are not using oral Truvada at present. Therefore, it is important to understand the potential interest in, and preferences for, both the existing and these future PrEP approaches. Furthermore, identification of beliefs about the key attributes of all these HIV prevention methods is crucial to designing a range of effective products that, in

¹Kellogg School of Management, Northwestern University, Evanston, Illinois.

²Department of Cell and Molecular Biology, Northwestern University Feinberg School of Medicine, Chicago, Illinois.

³Division of Infectious Diseases, Department of Medicine, Northwestern University Feinberg School of Medicine, Chicago, Illinois.

⁴Department of Medical Social Sciences, Institute for Sexual Gender Minority Health and Wellbeing, Northwestern University Feinberg School of Medicine, Evanston and Chicago, Illinois.

⁵HIV Center for Clinical and Behavioral Studies at the New York State Psychiatric Institute and Columbia University, New York, New York.

⁶Department of Biomedical Engineering, Northwestern University, Evanston, Illinois.

aggregate, will be more broadly embraced by populations at high risk of HIV, such as MSM, and thereby more effectively prevent HIV infection.

To facilitate the development of future PrEP products, we conducted user acceptance research, consistent with current best practices in the field of marketing and commercially available resources. In this study, we present the results of the qualitative consumer research, the first phase of our studies, aimed at identifying key PrEP product features that impact user acceptance. We aimed to understand perceptions of oral versus alternative PrEP methods among MSM and medical practitioners in Chicago, IL and San Francisco, CA. We sought reasons for usage/nonusage of current oral Truvada among MSM and explored reactions among both MSM and medical practitioners to PrEP injection and implant modalities, identifying the most relevant product attributes of these options. Our observations revealed that potential value to the users of long-acting PrEP formulations lies, from their perspective, more in simplifying their lives, rather than in facilitating adherence.

This study is among the first uses of a marketing research approach¹⁵ and the first one utilizing commercial resources to gather key customer insights to facilitate the development of sustained PrEP delivery systems targeted at a specific segment of the market. Its goal was to add information to advance new PrEP modalities more quickly and effectively. It is unique, because the focus groups are small and conducted rapidly as the goal was to identify overarching themes relating to consumer interest and marketing opportunities rather than attempting to elucidate the sociobehavioral mindset of target populations. In general, with this qualitative focus group research, the focus should be on identifying common patterns across participants. Findings are based on responses that reflect content themes that cut across participants despite differences in the way participants express themselves. Outlier responses are relevant in identifying why any participants disagree with a theme expressed by the group. Indeed focus groups should be conducted with groups that are homogeneous enough to exhibit a common perspective about something.¹⁶

Therefore, these consumer focus groups seek to identify key attributes from this qualitative information to be advanced to quantitative conjoint analysis that ranks importance of the attributes to end users. The results of the quantitative conjoint analysis are then utilized to develop discrete choice models that allow accurate prediction of user preferences when faced with all possible choices of product options to design the optimal product. These standard consumer market research approaches are commonly used by businesses to develop products that address under-met customer needs, although not yet common among academics. In this context, things such as packaging styles or branding can lead to success or failure of competitively marketed products. The goal of this study was to identify the attributes of the potential future PrEP products that would impact user choices among them.

Materials and Methods

Study design

The study consisted of focus group sessions with MSM and medical practitioners and was designed and moderated by two professors from the Kellogg School of Management, both highly experienced with qualitative research in the commercial sector. Outside marketing research firms (Schlesinger

Associates in Chicago and Survey Center Focus in San Francisco) were utilized to recruit the participants, blind to the purpose of the study, and to provide the focus group facilities and incentives to the participants. The study was conducted on a total of eight focus groups: two with MSM and two with medical practitioners in Chicago, IL and two with MSM and two with medical practitioners in San Francisco, CA. Each group of MSM had six participants. The lowest number of medical practitioners in the focus groups was two, and the highest was three. After consent, interested individuals completed the eligibility screener either through the Internet or over the phone. Eligible MSM and medical practitioners participating in the focus group discussions were paid an incentive or honorarium in appreciation of their time. The study procedures received a waiver from Northwestern University's Institutional Review Board.

Sample

Participants were at least 24 years old, not in a committed relationship, and had at least two sex partners in an average month (Table 1). They were sexually active with at least two biological male partners in the past month, able to provide informed consent, and were English speaking. Participants were recruited from Schlesinger Associates and Survey Center Focus participant registries and by advertisements on social and dating websites, such as Facebook. Eligible medical practitioners were currently working as physicians, physician assistants, or nurse practitioners at the office or clinic that regularly sees a large number of MSM patients, had at least 10 patients in the past 3 months who were prescribed Truvada, were involved in discussing healthcare issues and treatment alternatives with MSM patients, able to provide informed consent, and were English speaking. Participants were surveyed from Schlesinger Associates and Survey Center Focus participant registries and by flyers and posted advertisements in the local clinics.

The following background variables were collected to profile MSM population: age, ethnicity, sexual orientation, relationship status and sexual behavior, PrEP awareness and use, preferences for HIV prevention options (oral PrEP, injectable PrEP, and PrEP implants). Data collected to profile medical practitioners included information about their profession (title, practice setting, and years in practice), experience with gay patients, and prescribing Truvada and perception of different PrEP methods (pill, injection, and implant). All this information was collected through a questionnaire completed before participation in the interviews.

Procedures

All qualitative research sessions were video and audio recorded. The interviews paired each separate session with MSM with a medical practitioner session. This started with preliminary discussions with medical practitioners. Then, the focus groups with MSM took place, which were observed by medical practitioners from a room with a one-way mirror. Finally, at the end of each session, medical practitioners participated in a debriefing session during which they were asked about their reactions to the discussions among MSM about the PrEP alternatives. The focus groups were small and consisted of diverse participants who did not know each other but who had enough in common to promote free-flowing

TABLE 1. DESCRIPTIVE CHARACTERISTICS OF TWO MEN HAVING SEX WITH MEN FOCUS GROUP PARTICIPANTS IN CHICAGO ($N=12$) AND TWO IN SAN FRANCISCO ($N=12$)

	<i>Two Chicago focus group Total, n = 12, n (%)</i>	<i>Two San Francisco focus group Total, n = 12, n (%)</i>
Age, years		
24–33	5 (41.7)	5 (41.7)
34–43	2 (16.7)	5 (41.7)
44–53	4 (33.3)	1 (8.3)
54–63	1 (8.3)	1 (8.3)
Race/ethnicity		
Caucasian	8 (66.7)	5 (41.7)
Hispanic	2 (16.7)	2 (16.7)
Asian/Pacific Islander	1 (8.3)	3 (25)
African American	1 (8.3)	1 (8.3)
Other	0 (0)	1 (8.3)
Sexual orientation		
Gay	11 (91.7)	12 (100)
Bisexual	1 (8.3)	0 (0)
Sex partner in past 6 months		
Men	11 (91.7)	10 (83.3)
Men, women, and transgender men	1 (8.3)	0 (0)
Men and transgender women	0 (0)	1 (8.3)
Men and transgender man	0 (0)	1 (8.3)
Relationship status		
Not in a relationship	7 (58.3)	8 (66.7)
Casually dating but not serious	5 (41.7)	4 (33.3)
Sex partners in last 6 months		
2–5	4 (33.3)	3 (25)
6–10	8 (66.7)	5 (41.7)
11–15	0 (0)	1 (8.3)
15–20	0 (0)	3 (25)
Sex partners in average month		
2	11 (91.7)	4 (33.3)
3–5	1 (8.3)	7 (58.3)
6	0 (0)	1 (8.3)
Experience with Truvada®		
Currently taking on regular basis	4 (33.3)	7 (58.3)
Taken but no longer using	3 (25)	2 (16.7)
Considered using, not yet started	5 (41.7)	3 (25)

discussion among group members. The focus group moderator sought to introduce topics and issues related to the different forms of PrEP into the group discussion in a conversational manner. Participants were free to converse naturally—the moderator guided the discussion, but did not structure the way in which participants responded (a survey-like question and answer format was avoided). The materials shown to the focus group participants included PowerPoint presentation with information on oral PrEP and implants that are currently on the market for contraception and hormone replacement therapy, description of other PrEP options, such as injections and nondegradable implants. In addition, a

physical prototype of a nondegradable implant (not filled with any drug) was available for participants to see and feel.

Analytic approach

The focus group data were documented through a review of the focus group notes and video and audio recordings and transcripts. Major themes were identified and used to code relevant portions of the documented material. The participant quotes in this article came from this material.

Results

Sample characteristics

MSM participants' self-reported age, race/ethnicity, sexual orientation, relationship status, and number of sexual partners are given in Table 1. All MSM participants in both Chicago and San Francisco were aware of PrEP. Analysis did not reveal any differences between the Chicago and San Francisco focus groups in terms of the content themes reported. Participants in the San Francisco groups were somewhat more sophisticated in discussing the topics covered, but as noted all participants were very knowledgeable about HIV and PrEP. Table 2 describes the medical practitioner characteristics.

TABLE 2. DESCRIPTIVE CHARACTERISTICS OF MEDICAL PRACTITIONER TWO FOCUS GROUP PARTICIPANTS IN CHICAGO (TOTAL, $N=5$) AND TWO IN SAN FRANCISCO (TOTAL, $N=4$)

	<i>Two Chicago focus group Total, n = 5, n (%)</i>	<i>Two San Francisco focus group Total, n = 4, n (%)</i>
Title		
Healthcare professional	2 (40)	2 (50)
Nurse practitioner	1 (20)	0 (0)
Doctor of Pharmacy	1 (20)	0 (0)
Physician assistant	1 (20)	2 (50)
Gender		
Female	1 (20)	0 (0)
Male	4 (80)	4 (100)
Practice setting		
Private single-specialty group practice	3 (60)	4 (100)
Solo private practice	2 (40)	0 (0)
Years in practice		
6–15	2 (40)	1 (25)
16–25	2 (40)	2 (50)
26–35	1 (20)	1 (25)
MSM patients per year		
100–299	3 (60)	0 (0)
300–599	2 (40)	2 (50)
Above 600	0 (0)	2 (50)
Number of patients prescribed Truvada		
20–40	5 (100)	1 (25)
41–100	0 (0)	2 (50)
Above 100	0 (0)	1 (25)

MSM, men having sex with men.

Focus group themes

Discussions of PrEP with both MSM and medical practitioner participants provided qualitative in-depth insight into participants' thoughts, feelings, and reasoning regarding both oral and alternative modalities. Findings are organized around four main themes that emerged from content analysis of the interview discussions. All four themes revealed potential sources of value for using long-acting PrEP modalities relative to oral PrEP. The four themes and several related issues as noted hereunder were used to standardize the interview transcripts. Participant quotes selected from the focus group material are used to better convey the tenor of participants' comments.

Theme 1: adherence to pill taking. MSM participants were well versed in the latest understanding of PrEP efficacy and utilization. They also well understood the ability of oral PrEP to prevent HIV acquisition.

MSM participants experienced with oral Truvada expressed little concern about inconsistency in taking a daily Truvada pill for PrEP. As one MSM stated: *I'm like super crazy about mine, I have like a pill bottle that has like dates on it, so I make sure I don't ever miss a dose.* MSM were aware that it is difficult to be perfectly consistent, but most thought that they did not miss taking the pill often enough for this to matter. One MSM illustrated this point by saying: *I think it depends on your personality and the type of person you are. I think I've only not taken it two times just because I forgot. And I knew I wasn't going to be having sex—but like, for the most part, it's ingrained in my head that I need to take this every day. We don't all work the same way. Like you and I, it seems like we can take the pill every day because we have the memory for it, but some people might be forgetful. There's even days where like—I have an alarm set for my PrEP, it'll go off, I'll take PrEP, then five minutes later I'll think, 'did I take my PrEP'? Although they realize that it is always possible to miss taking a pill, participants were highly aware of the need for adherence and, most importantly, firmly believed that they were consistently adherent.*

Taking the pill strategically (PrEP on demand) was another reason why MSM thought that they took it consistently enough to stay protected. As one MSM said: *I'm not going to have sex for a few weeks. And so, I'll just let the pills kind of add up a little bit to save me some money down the road, but then I'll get back to having a full seven-day stretch of taking it before I would have sexual activity again.*

MSM felt that their adherence to pill taking was sufficient to ensure a high level of protection against HIV. To varying extents, some participants were not as concerned about other sexually transmitted diseases (STDs), because these can be cured or at least are less serious. One MSM illustrated this point by saying: *I was really, really into using condoms for years, and then I realized that sex is just way better without a condom, and like, it's just a lot harder to have that motivation now, especially when I'm in a community that's largely inoculated from HIV, and like, I have had other STDs as well and it's not fun, and it's not cute, but you take a pill and it goes away. For [HIV]—you know, cross your fingers, and it's a lot harder to use a condom now than it was earlier...it's likely true that there's more condom-less sex happening because of Truvada.*

Improved adherence associated with the usage of long-acting modalities was not seen as an advantage by some

MSM. One MSM said: *That is not a factor for me personally because I know the way that I take medication. Whether it's been antibiotics, or like I said, my allergy pills or whatever. I'm pretty darn consistent when it comes to stuff like that. Forgetfulness is not something that for me personally is a problem for pills. Lots of things I forget, but that is not something that is problematic for me. So, to me, I don't know that... Yeah, to me, that's not as much of a factor. I would suspect that if I was taking the pill the way that I think that I would, then it would be... My effectiveness rate would be as high as the other two [injections, implants].* There was skepticism that long-acting modalities would offer a higher level of protection than the pill. But as noted below, participants were very open to information indicating that it would.

In contrast to MSM, medical practitioner participants were concerned about adherence to PrEP and agreed that they stress full adherence to daily pills when talking to patients about Truvada, although they think that protection is cumulative. One participant illustrated this point by saying: *We know that's not true [that you have to take it every single day], but we drive it home that you have to take it every single day. We really actually know that taken three times a week, it is probably effective. But when you deal with patients, if you ask them to take it 100%, you win if you get 80% into the patient. If you ask them to take 80%, then you get 50% into the patient. It's always hammered home, 100%.*

Medical practitioners recognized that long-lasting PrEP methods (injections and implants) could provide better adherence. However, they were skeptical that achieving better adherence would be a reason for MSM to choose them over the pill. One physician illustrated this point by saying: *If consistency was the only thing, a lot more women would be using the Mirena [hormone releasing IUD] because it's very efficacious. There are a lot of factors that come into it. There are still women that use the pill because they're so comfortable with it, it's what they grew up with, it's what they know. Having it be convenient and consistent doesn't guarantee absolute use of it, unfortunately.* Thus, both medical practitioners and MSM believe that more consistent adherence would not be a major advantage for long-acting modalities.

Theme 2: familiarity and user control of pill. Pill modality was associated with control, as it left it up to the participant whether/when they started and stopped PrEP. Likewise, MSM not currently on PrEP believed that they could easily start taking the pill. The only reason for not taking the pill was cost or not engaging in sex, but the pill is a readily available option. One MSM illustrated this point by saying: *I have been on it, tried it. Right now, I'm okay. I don't want to take a drug if it is not necessary right now. Lower risk right now, so... Not to say I'm not going to go back to it.*

Medical provider participants also recognized the value patients saw in control over factors such as cost and being able to make their own decisions based on sexual inactivity. One medical provider stated: *I had a patient who was on PrEP, got involved in a monogamous, long-term relationship and after a couple months decided, "Why am I taking this pill every day?" and stopped on his own. Now he's in a monogamous relationship, he is trusting his partner with his life, but I think that's not an unreasonable response.*

MSM realize that other people may or may not be on PrEP. However, they did not believe that this has anything to do

with the pill modality. In fact, they view not taking the pill as somewhat inexplicable given the ease of using it. One MSM stated: *I'm always surprised, though, when I find friends that aren't on it. Especially if I know that they're out there having sex. I think that's always shocking to me nowadays, because I know it's easy to do now. So, there's no reason you shouldn't at least try it.*

Familiarity and control make MSM comfortable with the pill modality. They do not see any drawbacks to the pill; their satisfaction with it is high. Overall MSM and practitioners were receptive to the pill modality and believed that the availability of long-acting PrEP (injections or implants) would not encourage people to start PrEP, given that they saw the oral modality as a positive, not a negative.

Theme 3: simplicity associated with long-acting PrEP. Some MSM participants, but not all, saw value in long-acting PrEP methods (injections and implants) based on the belief that these could simplify their busy lives. As one said: *I think I would probably do the implant, for me it's what is the least amount of work, or least maintenance and it seems like the annual implant, even with three month's testing, getting the actual implant once a year seems a lot easier for me than even injections every few months or dealing with a pill.* Those expressing interest in the long-acting PrEP formulations did not do so because of any dissatisfaction with the pill modality *per se*. Long-acting methods interested them because they seemed to be a good fit with their busy lifestyle.

Overall, MSM believed that simplicity was an advantage of both injections and implants, but they were unsure of whether that would outweigh possible disadvantages, such as having less control over when to stop using PrEP, relative to pills. As one said: *I would personally probably do pill because I like the flexibility of it to be able to stop when I want to stop.* Even those who expressed interest in long-acting modalities because of their lifestyle advantages were also ambivalent about them because of the pill's familiarity and ease of control. For example, one participant initially said: *I would definitely do that [implant]. I'm on the go a lot, and my belongings get spread out everywhere. Like sometimes I'll leave on Friday and be in different places all the time. So, I think having one less thing to worry about doing every day is appealing to me.* Subsequently the same participant, thinking about the advantages of the pill, said: *I would not like an implant one bit.*

The value of lifestyle simplicity was also reflected in MSM's thoughts about the specific attributes of alternative modalities, such as timing and steps, visibility, perceptibility, durability, side effects, and cost. For example, MSM expressing interest in injections tended to favor the idea of one large dose shot versus multiple smaller shots. (However, those who saw little value in injections, saw the large shot as a negative in that it might be more painful.) Consistent with this, medical practitioner participants expected that some MSM would value the simplicity of injections. As one medical provider said: *I think for the injection, it's going to depend on how often they take it. It could be like the Depo form where they only take it maybe three or four times per year. Anything other than that, I think it would be more difficult than taking the pills daily. Injections are usually more difficult to sell to patients.*

For implants, it was difficult for MSM to consider the tradeoff of one larger dose implant relative to multiple

smaller dose implants. Both seemed overly painful. The larger dose did have the advantage of simplicity. As one participant said: *I would probably lean towards just the larger one. It just seems less invasive even though the three small ones might equal the same size, I think mentally, it seems less invasive if they are only putting something in once and taking it out once versus like boom, boom, boom and then withdrawing it three times.* Along the same lines, there was preference for biodegradable implants over removable ones. MSM thought removing the implant would mean two procedures instead of one and would be even more intrusive and painful. One said: *I like the biodegradable as well, I mean I, I mean I've had dissolvable stitches and stitches that you had to take out, and I prefer that, it just seems like there is less maintenance and work involved and less follow-up.*

Theme 4: potential for more effective HIV prevention. MSM participants believe that the pill modality is effective, so they did not see an advantage for long-acting modalities in terms of effectiveness. To probe how they would respond to any claim for greater effectiveness, MSM were told that contraception implants were more effective than pills. Several who had been against using a PrEP implant earlier in the session turned around and said they felt it would be their responsibility to help end the epidemic by using an implant rather than pills if superior effectiveness was true also for HIV prevention. There was a real shift in overall group attitude as indicated by participant's explicit expressions of interest. MSM are open to claims about enhancing effectiveness although they see the pill as effective. Even a small increase in effectiveness would be valued.

Other themes: perceptibility, safety, and costs. Other issues were important to participants but not as important as those described above based on participants' own remarks. Participants did not like the idea that implants might be visible to others and could leave scars affecting personal appearance. One said: *I kind of thought this (implant) would be invisible, you wouldn't be able to see, or feel it or touch .... I want my skin to look a certain way. I want a certain appearance and this seems it would disrupt that aesthetically pleasing thing about my body.* Medical practitioners were well aware that MSM could object to implants because of appearance. One said: *But most of the community, the moment you say scars, they say, "No. Hell, no."*

There was almost no concern, however, that implants could complicate a person's life by identifying him as on PrEP. Personal appearance and perceptibility were only important because of concerns about body image.

Another concern of some MSM participants was that they might be overly aware of an implant. Some thought that it might feel weird or that they might be prone to touching it too much. As one said: *I just can't get over the fact that having something in your body that you can touch.*

There was concern about safety, particularly whether an implant might break or move around in the body. It seemed plausible to MSM that this sort of complication could arise as, for instance, with some sort of blow to the body. One MSM said: *What happens if you're playing sports or something and you get hit right there, boom, really so what would happen?* Another said: *Would there be a risk if you got cut and it was*

cut, that it would release a huge amount of dose in your system? Complications from drug side effects were a concern for pills and implants. However, this seemed mitigated by the self-control over pill taking described before. MSM were aware that PrEP pills can have side effects but they believed that these were typically not severe and manageable by interrupting pill taking. For example, one participant said: *At first I, didn't feel any symptoms or anything, but my tests kept coming back and said my—some of my, like my liver was wrong. So, my doctor actually told me to stop taking it for like three months, and then I got back on it and so far, my levels have been fine, but he thinks that at some point when I started taking PrEP it was too much on my body, at first. But hasn't been a problem since.*

MSM anticipated that the costs of alternative modalities would not be extraordinary. They were cost sensitive, but those already on PrEP had secured necessary financial assistance in the past. If injections or implants were to cost more than oral PrEP, this would be a negative factor unless more financial assistance were available. Alternatively, lower cost would be an advantage: *If for some reason the pricing model of the implant was much superior to the injection or versus the pills, like to me, I'm very price sensitive about this because of my own personal situation, and so that would be a consideration.*

Discussion

Consistent adherence to oral PrEP remains difficult, despite efforts to overcome this hurdle to effectiveness.^{6,17} Some of the factors limiting consistent adherence include user concerns about PrEP efficacy and side effects and also access to counseling, testing, or support.¹⁸ This corresponds with broader data on adherence to other prescribed medications.^{19,20} It is estimated that users take only 50% of prescribed doses of any drug and adherence can be suboptimal even for potentially life-threatening conditions, causing an estimated 125,000 annual deaths.²¹ The availability of implant and injectable modalities that can ensure drug delivery over months has potential to further decrease issues with adherence relative to oral PrEP taken either daily or on-demand before/after sex.

The great potential of implant and injectable PrEP modalities to increase effectiveness of prevention depends, however, on uptake and acceptance by users, such as MSM. In this study we focused on those MSM already knowledgeable about PrEP and motivated to use it. They represent a population seeing a value in PrEP that could potentially be more likely to accept alternative delivery modalities. All MSM participants in this study were aware of PrEP and well educated about its efficacy and utilization. Although this population is only one segment of all potential PrEP users, it is an important one that could possibly be early adopters and influencers when new PrEP products are introduced. Acceptability to such MSM (or at least lack of rejection) could help expand “coverage” of PrEP overall to those not now using or consistently adhering to oral PrEP, arguably the users who would gain the most from new sustained release products.

The MSM investigated in this study were both informed and motivated to use Truvada. MSM participants were not only aware of PrEP, but also very knowledgeable about it. They

understood the importance of taking PrEP to prevent HIV and some of them were surprised about the low proportion of at-risk gay men on Truvada. We found that some MSM participants expressed they used PrEP to protect themselves against HIV when having condom-less sex. They want to have satisfactory sexual experiences and as one of the study respondents said that sex without condoms is perceived by many as more satisfying than sex with condoms. These findings are consistent with other research on correlation between sexual behavior and willingness to use oral PrEP.^{22,23}

Unexpectedly, our results suggest that, for the studied population, the promise of enhancing medication adherence by using long-acting PrEP methods may not be seen as the major attribute of sufficient value to lead MSM to choose them over oral PrEP. Although other research indicates that MSM might quit taking Truvada because of the struggle with daily pill taking, we found that interest in long-acting formulations could be driven by the perception that they would be simpler. Our research shows that MSM would view alternative PrEP methods positively as a way of simplifying their lives. It is also noteworthy that participants markedly shifted to favoring the long-acting methods and expressed an “obligation” to help stop HIV spread, when informed that there may be parallels to contraception where long-acting methods have proven more effective than pills. This highlights that results of future research comparing effectiveness of oral versus long-acting PrEP may be critical to increase overall PrEP uptake and use, if better effectiveness is shown. Focusing on that result, if achieved, may be more persuasive for promoting use than describing that more consistent drug levels are presumed to be the mechanism.

Other relevant results were the concerns about perceptibility of the implant by the user and/or others, safety, and costs. In the next quantitative phase of this market research, further details will be sought on these issues. The objective will be to guide development of information that will minimize possible early removals of the implant because of one of these concerns. The goal of broadening of the PrEP user base by adding an implant modality could benefit from maximizing satisfaction of early adopters and influencers, such as those sampled here.

This study has several limitations. By their nature, focus group studies are not intended for statistical generalization.¹⁶ Focus groups provide in-depth insight into the beliefs and attitudes of individuals and can provide the bases for the development of quantitative surveys that may provide more generalizable findings and guidance for development and implementation. Yet, the group setting provides a non-threatening peer-to-peer social milieu that stimulates participants to be more forthcoming, thus highlighting issues that merit attention in the early stages of product development. Unexpectedly, PrEP awareness and uptake among MSM in this study were much higher than estimates reported in other research.^{24–26} This may be because of the age range and race/ethnicity of participants (24–52 years in Chicago and 28–61 years in San Francisco, mostly whites). Previous research mainly focused on younger populations of MSM and indicated that the level of PrEP awareness among this group remains low.²⁷ Other studies have also shown that the uptake among white MSM is higher than in other MSM populations.²⁶ The present results may not hold for MSM who are nonwhites. Alternatively, these focus groups were completed

at a time when PrEP is becoming well known and clearly effective, which was reflected in the increased awareness and uptake of PrEP in our study population. With the limitation that the present findings are specific to the targeted market segment, they reveal simplicity as potential messaging to promote wider uptake of long-acting PrEP modalities over pills in multiple high HIV risk populations, given the current knowledge. Educating providers on this approach may also help them to achieve their goal of encouraging PrEP use by persons with characteristics different from those we studied (e.g., those not starting or consistently using oral PrEP), who may benefit more than current PrEP pill takers from future long-acting PrEP. Encouraging them to try future long-acting products by focusing on simplification may be more persuasive than a message about better adherence that may not be perceived as relevant. Finally, results suggest that if long-acting methods are shown in the future to improve effectiveness, it would also be an effective message to enhance their use.

Importantly, these market-oriented focus groups succeeded in identifying key attributes of consumer interest to be utilized in quantitative conjoint analysis directing long-acting implant formulations. Under this umbrella of simplicity, parameters such as pain, effectiveness, cost, duration, location, visibility, and side effects will be evaluated. Once the relative importance of these key attributes is determined and utilized to develop the optimal implant for the consumer perspective, the promise of greater lifestyle simplicity derived from using long-acting formulations should be a key marketing message.

Acknowledgments

The authors thank members of the Patrick Kiser Laboratory for providing a physical prototype of a nondegradable implant. The authors also thank all participants for their time, effort, and critical insight. This work was supported by the SLAP-HIV Program (UM1 AI120184 to T.J.H. and P.F.K.).

Author Disclosure Statement

No competing financial interests exist.

References

1. CDV. HIV Surveillance Report. 2014;26:1–123. Available at cdc-hiv-surveillance-report-2014-vol-26.pdf, accessed October 3, 2018.
2. Calabrese SK, Magnus M, Mayer KH, *et al.*: “Support Your Client at the Space That They’re in”: HIV pre-exposure prophylaxis (PrEP) prescribers’ perspectives on PrEP-related risk compensation. *AIDS Patient Care STDS* 2017;31:196–204.
3. Kasaie P, Pennington J, Shah MS, *et al.*: The impact of preexposure prophylaxis among men who have sex with men: An individual-based model. *J Acquir Immune Defic Syndr* 2017;75:175–183.
4. Koenig LJ, Lyles C, Smith DK: Adherence to antiretroviral medications for HIV pre-exposure prophylaxis: Lessons learned from trials and treatment studies. *Am J Prev Med* 2013;44(Suppl 2):S91–S98.
5. Saag MS, Benson CA, Gandhi RT, *et al.*: Antiretroviral drugs for treatment and prevention of HIV infection in adults: 2018 recommendations of the International Antiviral Society-USA Panel. *JAMA* 2018;320:379–396.
6. Amico KR, Stirratt MJ: Adherence to preexposure prophylaxis: Current, emerging, and anticipated bases of evidence. *Clin Infect Dis* 2014;59(Suppl 1):S55–S60.
7. Molina JM, Capitant C, Spire B, *et al.*: On-demand pre-exposure prophylaxis in men at high risk for HIV-1 infection. *N Engl J Med* 2015;373:2237–2246.
8. Boffito M, Jackson A, Owen A, Becker S: New approaches to antiretroviral drug delivery: Challenges and opportunities associated with the use of long-acting injectable agents. *Drugs* 2014;74:7–13.
9. Dolgin E: Long-acting HIV drugs advanced to overcome adherence challenge. *Nat Med* 2014;20:323–324.
10. Golub SA, Enemchukwu CU: The critical importance of retention in HIV prevention. *Lancet HIV* 2018;5:e475–e476.
11. Baeten JM, Haberer JE, Liu AY, Sista N: Preexposure prophylaxis for HIV prevention: Where have we been and where are we going? *J Acquir Immune Defic Syndr* 2013;63(Suppl 2):S122–S129.
12. Hosek S, Celum C, Wilson CM, Kapogiannis B, Delany-Moretlwe S, Bekker LG: Preventing HIV among adolescents with oral PrEP: Observations and challenges in the United States and South Africa. *J Int AIDS Soc* 2016;19(Suppl 6):21107.
13. Van der Elst EM, Mbogua J, Operario D, *et al.*: High acceptability of HIV pre-exposure prophylaxis but challenges in adherence and use: Qualitative insights from a phase I trial of intermittent and daily PrEP in at-risk populations in Kenya. *AIDS Behav* 2013;17:2162–2172.
14. Ware NC, Wyatt MA, Haberer JE, *et al.*: What’s love got to do with it? Explaining adherence to oral antiretroviral pre-exposure prophylaxis for HIV-serodiscordant couples. *J Acquir Immune Defic Syndr* 2012;59:463–468.
15. Galea JT, Kinsler JJ, Salazar X, *et al.*: Acceptability of pre-exposure prophylaxis as an HIV prevention strategy: Barriers and facilitators to pre-exposure prophylaxis uptake among at-risk Peruvian populations. *Int J STD AIDS* 2011;22:256–262.
16. Calder BJ: Focus groups and the nature of qualitative marketing research. *J Mark Res* 1977;14:353–364.
17. Parsons JT, Rendina HJ, Lassiter JM, Whitfield TH, Starks TJ, Grov C: Uptake of HIV pre-exposure prophylaxis (PrEP) in a national cohort of gay and bisexual men in the United States. *J Acquir Immune Defic Syndr* 2017;74:285–292.
18. Golub SA, Gamarel KE, Rendina HJ, Surace A, Lelutiu-Weinberger CL: From efficacy to effectiveness: Facilitators and barriers to PrEP acceptability and motivations for adherence among MSM and transgender women in New York City. *AIDS Patient Care STDS* 2013;27:248–254.
19. Aronson JK: Compliance, concordance, adherence. *Br J Clin Pharmacol* 2007;63:383–384.
20. van Dulmen S, Sluijs E, van Dijk L, de Ridder D, Heerdink R, Bensing J: Patient adherence to medical treatment: A review of reviews. *BMC Health Serv Res* 2007;7:55.
21. Viswanathan M, Golin CE, Jones CD, *et al.*: Interventions to improve adherence to self-administered medications for chronic diseases in the United States: A systematic review. *Ann Intern Med* 2012;157:785–795.
22. Aghaizu A, Mercey D, Copas A, Johnson AM, Hart G, Nardone A: Who would use PrEP? Factors associated with

- intention to use among MSM in London: A community survey. *Sex Transm Infect* 2013;89:207–211.
23. Saberi P, Gamarel KE, Neilands TB, *et al.*: Ambiguity, ambivalence, and apprehensions of taking HIV-1 pre-exposure prophylaxis among male couples in San Francisco: A mixed methods study. *PLoS One* 2012;7:e50061.
24. Bauermeister JA, Meanley S, Pingel E, Soler JH, Harper GW: PrEP awareness and perceived barriers among single young men who have sex with men. *Curr HIV Res* 2013;11:520–527.
25. Greene GJ, Swann G, Fought AJ, *et al.*: Preferences for long-acting pre-exposure prophylaxis (PrEP), daily oral PrEP, or condoms for HIV prevention among U.S. men who have sex with men. *AIDS Behav* 2017;21:1336–1349.
26. Kuhns LM, Hotton AL, Schneider J, Garofalo R, Fujimoto K: Use of pre-exposure prophylaxis (PrEP) in young men who have sex with men is associated with race, sexual risk behavior and peer network size. *AIDS Behav* 2017;21:1376–1382.
27. Dolezal C, Frasca T, Giguere R, *et al.*: Awareness of post-exposure prophylaxis (PEP) and pre-exposure prophylaxis (PrEP) is low but interest is high among men engaging in condomless anal sex with men in Boston, Pittsburgh, and San Juan. *AIDS Educ Prev* 2015;27:289–297.

Address correspondence to:

Thomas J. Hope

Department of Cell and Molecular Biology

Northwestern University, Feinberg School of Medicine

9-290 Robert H. Lurie Medical Research Building

303 East Superior Avenue

Chicago, IL 60611

E-mail: thope@northwestern.edu