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Community Belonging and Attitudes Towards HIV Pre-Exposure Prophylaxis (PrEP) Among Transgender Women

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Abstract

For transgender (trans) women, community belonging may play an important role in shaping perceptions of HIV Pre-exposure Prophylaxis (PrEP). A cluster analysis was performed using data obtained from a survey administered to 128 trans women residing in Philadelphia, PA and the San Francisco Bay area, CA. Six items assessing feelings of community belongingness among trans women produced three distinct clusters. Associations were examined between cluster membership and perceptual items including beliefs about PrEP, experiences with healthcare, patient self-advocacy, and perceived trusted sources for PrEP information. Clusters were demographically comparable apart from age. There were significant differences noted between trust in various communication channels and perceptions of PrEP; the least community-connected cluster had less trust and more negative perceptions of PrEP. Analyses suggest that psychographic differences exist based on perceived community belongingness in this population, and this in turn may be consequential in determining how information about PrEP is communicated and diffused to trans women for whom PrEP may be indicated.

Keywords

PrEP; Transgender (trans) women; Health communication; Community health

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Authors Contribution All authors discussed and contributed to the final manuscript.

Conflict of interest None.

Ethical Approval Temple University and the University of California: San Francisco institutional review boards independently reviewed and approved this study.

Introduction

Transgender (trans) women are disproportionately affected by HIV [1]. This disparity in HIV burden is commonly attributed to a confluence of structural, psychosocial and biological factors [2]. As such, trans women have been identified as a population for whom HIV pre-exposure prophylaxis (PrEP) is indicated [3]. Despite this, PrEP uptake and adherence among trans women remains suboptimal [4] and barriers to access and acceptability that are specific to this population likely exist [5]. However, to date, few PrEP studies have focused specifically on trans women either in PrEP demonstration studies [6] or in determining trans women-specific barriers to PrEP access, acceptability, and use [7]. Further complicating the matter is that PrEP research utilizing sexual and gender minority (SGM) samples have tended to aggregate trans women with cisgender men who have sex with men (MSM), a tendency which has obscured trans women-specific barriers and facilitators to PrEP use to the detriment of PrEP promotion and health communication efforts targeted to this population [8, 9].

Though few studies have examined trans women's specific barriers to PrEP, they have consistently demonstrated that among trans women who are aware of PrEP, perceptions of PrEP are largely positive and willingness to use PrEP is predominantly high [2, 10]. As such, one might assume that increased awareness would lead to increased uptake of PrEP among this population. However, there are many dispositional and systemic barriers to PrEP uptake among trans women [11]. Thus, as with other populations, widespread awareness is likely insufficient on its own to increase trans women's uptake and adherence to PrEP. A more subjective approach to understanding the determinants of PrEP use among trans women is likely required. This has significant implications for health communication, which typically target prevention messages to broader groups based on demographics. The use of segmentation analysis is one way to better describe groups to target messages [12, 13]. Trans identity cuts across all ages, races, and ethnicities, making a "one size fits all approach" to message development problematic. Indeed, much of the current PrEP messaging has been aimed at cisgender MSM and trans women together, which assumes that the most relevant messages about PrEP will be the same for both populations.

Community connectedness has been shown to be a highly consequential factor in determining physical and mental health, particularly among SGM individuals [14, 15]. Frequently employed as part of the Minority Stress Model [16], community connectedness is theorized to act as a buffer against the stigmatization and victimization often encountered by SGM individuals. Additionally, community connectedness may also function in a more utilitarian capacity as a means of increasing one's exposure to health-related messages and access to information generally. Trans and gender diverse (TGD) individuals may be particularly preferential towards their own communities as sources of information [17]. Information-seeking behavior among trans individuals may be informed by the experiences of seeking information early in the process of forming a trans identity [18]. Due to concerns regarding personal safety, fear of disclosure of trans identity and wariness about the accuracy of information related to gender transition and other health information, communities of other trans women may be the sole or primary source of information for trans women early in the process of trans identity development [19].

Understanding how segments of the population differ in their trust of information source or other psycho-behavioral variables may hold implications for PrEP use. An approach commonly used to augment health communication efforts to a population is to utilize the health communication channel preferred by those individuals. However, trans women have been shown to be highly heterogeneous in ways that might influence or determine their preference for health communication channels and perceptions of PrEP, such as their level of social integration [20] and medical mistrust [21]. Noting this, we examined the associations between community connectedness, communication channel preference, and several other perceptual variables among trans women to understand how PrEP programs could integrate messages about PrEP in a culturally sensitive and appropriate way using communication channels most likely to be trusted by trans women's communities.

Methods

These analyses utilized data from a study on the barriers and facilitators of PrEP use among transgender women residing in two US cities. Survey data were collected between April and December of 2018 using an instrument developed by the authors and based on extensive previous qualitative work [7, 22] and we present only the quantitative results of those surveys here. Surveys were self-administered and completed by trans women in the San Francisco, CA and Philadelphia, PA areas. Participants were identified through active and passive recruitment. All enrollment and study activities were completed in-person. Members of the research team identified potential participants through trans-focused support groups, community-based organizations and health centers, and a trans health conference open to the public. Members of the research team who assisted with recruitment included members of trans communities in their respective cities. Potential participants were provided a brief description of the survey noting that they would be asked to provide their opinions about PrEP. They were also provided a set of easy to read laminated pages on what PrEP is, who it is for, and how it differs from post-exposure prophylaxis (PEP) before answering questions about their feelings about PrEP.

Participants

To be eligible to participate, participants self-identified as a trans woman, were at least 18 years of age, were living in the greater Philadelphia or San Francisco Bay areas, and were HIV negative or of unknown HIV status. Participants (n = 128) provided verbal consent prior to taking the survey and received a \$15 gift card upon completion. Temple University and the University of California: San Francisco institutional review boards independently reviewed and approved this study.

Measures

The survey instrument developed by the authors was the product of formative qualitative work, which included focus groups conducted with trans women and in-depth interviews with healthcare providers in both California and Pennsylvania [7, 22, 23]. Each transcript was coded by two members of the research team (JB and PJK) using a codebook established following the principles of Applied Thematic Analysis [24]. Dedoose, an online mixed-methods software, facilitated analyses. The coding process and thematic concepts were

verified by the PIs (SBB and JS) to inform survey development. The items were then further refined through review by additional members of the research team, including trans women, and PrEP providers.

The survey consisted of 75 Likert scale items in addition to items to ascertain basic sociodemographics. Likert scale items were presented in blocks corresponding to themes that emerged in qualitative analysis (for a full list of items arranged by theme, see Table 1). Each scale item was presented in the form of a statement with participants asked to assign a value from 0 to 10 in accordance with how much they agree or disagree (0 = *strongly disagree*, 10 = *strongly agree*). The following basic sociodemographics were also included: race and ethnicity, which was made non-exclusive (assessed as 1. *African American/Black*, 2. *Hispanic/Latinx*, 3. *White*, 4. *Asian or Pacific Islander*, *Multiracial*, or *Other*) highest level of education completed (assessed as 1. *High school/GED and Below*, 2. *Some College*, 3. *College and Above*), perceived income status (assessed as 1. *I have enough money to live comfortably*, 2. *I barely get by on the money I have*, 3. *I cannot live on the money I have*), health insurance status (*Do you have health insurance? [yes/no]*), Housing status (*Have you been homeless or lived in a shelter in the last 30 days? [yes/no]*), history of sex work (*Have you ever exchanged sex for money, food, housing or drugs? [yes/no]*), and hormone use (*Are you currently taking hormones? [yes/no]*). Perceived personal level of HIV risk was assessed via a single item from the perceived risk of HIV infection scale (PRHS) (*I think my chances of HIV infection are: 1. Zero, 2. Almost Zero, 3. Small, 4. Moderate, 5. Large, 6. Very Large*) [25].

Finally, items related to PrEP use, awareness and knowledge were included: Intent to use PrEP (*If your doctor asked you right now to decide about using PrEP how do you think you would answer using a scale from 0 to 10?*). Responses to this intent item were coded as 7–10 representing *high intent* to be consistent with how this scale has been used in previous studies [21]. PrEP awareness (assessed as, *before today have you ever heard about PrEP? [yes/no]*), and past PrEP use (*have you used PrEP in the past but no longer use it? [yes/no]*). Those who had heard of PrEP before were asked a follow-up question to ascertain who and where the information came from with possible responses including a doctor, a friend, another trans woman, or a family member and were made non-exclusive. PrEP knowledge was also assessed through seven true or false statements regarding PrEP (eg. *“PrEP does not protect you from other sexually transmitted infections”*). Correct responses were tallied and a knowledge score was computed ranging from 0 to 7.

The remaining 68 items assessed attitudes, beliefs and perceptions separated into seven statement blocks including those about trans community connectedness (see Table 1 for specific statements). Each statement block corresponds to a theme that emerged in the formative analysis as follows:

- **Trans Community Connectedness:** Items (n = 6) addressed feelings of belonging, support and comfort with trans community, how much time is spent with other people who are trans, as well as sex being an affirming part of trans identity.

- **PrEP Communication Channel:** Items (n = 9) included statements about different communication channels and whether they are trusted sources for PrEP information.
- **PrEP Benefits:** Items (n = 11) provided statements reflecting reasons why some trans women might want to use PrEP.
- **PrEP Barriers:** Items (n = 13) provided statements addressing reasons why some trans women might not use PrEP and concerns about PrEP.
- **PrEP Beliefs:** Items (n = 9) included statements aimed to reflect common perceptions of PrEP.
- **Healthcare Experiences:** Items (n = 14) addressed both positive and negative perceptions of health care including real and perceived instances of discrimination by healthcare professionals.
- **Patient Self-Advocacy:** Items (n = 6) were adapted from a validated scale [26] and assessed feelings of self-efficacy around health information-seeking.

Analytic Plan

To examine associations between community belongingness, preferred health communication channel, and other constructs of interest, we performed a K-means cluster analysis using the total sample of 128 trans women. Classification was based on six items assessing trans community connectedness (Table 1). The K-means approach to clustering is a non-hierarchical method for discerning latent subgroups within a sample. Individual cases are assigned to clusters according to their proximity to the nearest centroid (mean) of the constituent items [27]. This is performed iteratively until the specified number of clusters is produced, maximizing the distance between each cluster. Considering the total sample size and the desire to maximize the distinctiveness between each cluster, we specified a three cluster solution. Three cases were dropped from the final cluster solution due to missing data, leaving an analytic sample of n = 125 trans women. Once a cluster solution was found, associations between cluster membership and other survey items were assessed through means comparisons using one-way ANOVA and chi-square tests of independence with an alpha value 0.05 used to determine statistical significance. Means comparisons in ANOVA were subjected to Tukey's *honest significant difference* post-hoc tests to confirm significant differences between the three clusters. All analyses were done with SPSS v. 23 [28].

Results

Cluster Analysis

Convergence in the cluster solution was achieved after 11 iterations. Differences between clusters based on their constituent items were analyzed to create definitions for each of the three clusters. Table 1 reports the means for each item delineated by cluster. By examining the means and distributions of the items comprising the three clusters, we labeled the clusters *Community Active* (n = 73, 58%), *Community Established* (n = 32, 26%) and *Community Unengaged* (n = 20, 16%). The *Community Active* cluster was identified based on the relatively high endorsement of statements related to having a strong

sense of belonging with the transgender community, feeling most comfortable around other transgender people, and identifying sex as an important part of their trans woman identity. Similarly, *Community Established* cluster members also indicated strong agreement with feeling a sense of belonging and support for and from a transgender community but did not as strongly associate with the importance of spending time within the transgender community or with sex being a way to feel good as a trans woman. Finally, the *Community Unengaged* cluster was defined on the basis of the relatively low agreement with statements related to feeling a sense of belonging, a desire to spend time with, or supporting a transgender community. However, they did identify sex as important to their trans woman identity relative to the *Community Established* cluster. These labels merely reflect one possible interpretation of how clusters are differentiated and should be interpreted as such. We use the terms *Community Active*, *Community Established*, and *Community Unengaged* simply as a means of applying common nomenclature to denote how segments differed in a holistic sense. Figure 1 presents the clusters with the means of their constituent items plotted to assist with comparisons.

Sample Demographics

Table 2 provides a summary of demographics and other variables of interest including PrEP use and PrEP awareness items for the total analytic sample and each cluster. No significant differences were observed between clusters based on demographics such as race, education and income. The only significant differences between clusters were with regard to perceived HIV risk, having ever known someone who has taken PrEP, PrEP knowledge, and age. A smaller proportion of those in the *Community Active* cluster perceived their HIV risk to be zero or almost zero (38%) compared to the *Community Unengaged* (60%) and *Community Established* (56%) clusters ($\chi^2(2, N = 120) = 5.9, p = 0.05$). Members of the *Community Established* and *Community Active* clusters were significantly more likely to have known someone who had taken PrEP (72% and 69%, respectively) compared to those in the *Community Unengaged* cluster (35%) ($\chi^2(2, N = 114) = 9.8, p = 0.007$). *Community Unengaged* members also demonstrated significantly less PrEP knowledge ($M = 5.4, SD = 1.9$) relative to *Community Engaged* and *Community Established* individuals ($M = 6.4, SD = 1.2$ and $M = 6.5, SD = 0.9$, respectively) ($F(2, 112) = 5.1, p = 0.007$). In terms of age, *Community Established* cluster members were older on average with a mean age of 46 years ($SD = 15.8$) compared to *Community Active* and *Community Unengaged* individuals ($M = 38, SD = 13.8$ and $M = 35, SD = 13.9$, respectively) ($F(2, 119) = 5.1, p = 0.007$). While not statistically significant, those in the *Community Established* cluster did report higher intent to use PrEP (72%) than *Community Active* (66%) and *Community Unengaged* (50%) clusters ($\chi^2(2, N = 119) = 2.7, p = 0.28$).

Perceptual Variables

Individual items comprising each of the seven blocks were analyzed using one-way ANOVA. The results of significant omnibus tests were confirmed using Tukey's HSD. Omnibus F test results and post-hoc results are reported in Table 1 for all items. Significant results by block are described below and report only clusters that significantly varied as confirmed in post-hoc analysis.

PrEP Communication Channels

Some differences were noted in examining responses to items related to trust in PrEP communication channels by cluster. Notably, *Community Active* cluster members indicated stronger preference for PrEP information to be delivered by a doctor who also provides hormones compared to both the *Community Established* and *Community Unengaged* members ($M = 7.9, SD = 3.0$ vs. $M = 6.9, SD = 3.8$ and $M = 5.4, SD = 3.6$; $F(2,118) = 4.2, p = 0.01$). These clusters diverged similarly with regard to trusting PrEP information more if it came from someone who is taking PrEP; wherein the *Community Active* cluster indicated greater trust relative to the *Community Unengaged* cluster ($M = 7.7, SD = 3.4$ vs. $M = 5.5, SD = 3.8$; $F(2,116) = 4.5, p = 0.01$). Both *Community Active* and *Community Established* clusters endorsed wanting to see more information about PrEP on social media relative to the *Community Unengaged* cluster ($M = 7.8, SD = 3.3$ & $M = 8.3, SD = 3.4$ vs. $M = 5.4, SD = 3.9$; $F(2,116) = 4.8, p = 0.01$).

PrEP Benefits

Few differences were observed between clusters on statements related to perceived benefits of PrEP. However, *Community Unengaged* members indicated less support for the statements that “PrEP would make me feel more in charge of my life” ($M = 5.2, SD = 4.3$ vs. $M = 7.4, SD = 3.2$ & $M = 8.4, SD = 2.6$; $F(2,115) = 5.6, p = 0.005$), that PrEP would only require taking one pill per day ($M = 5.8, SD = 3.9$ vs. $M = 7.9, SD = 3.3$ & $M = 8.8, SD = 2.0$; $F(2,114) = 4.9, p = 0.009$), and that “PrEP is safe and effective for trans women to use” ($M = 6.4, SD = 3.8$ vs. $M = 8.5, SD = 2.5$ & $M = 9.6, SD = 1.3$; $F(2,112) = 8.4, p < 0.001$) relative to the *Community Active* and *Community Established* clusters.

PrEP Barriers

Differences in perceived PrEP barriers were observed in comparisons of the *Community Unengaged* cluster with the other two. Those in the *Community Unengaged* cluster expressed higher levels of agreement with the statements that “PrEP is only for gay men” ($M = 3.2, SD = 4.0$ vs. $M = 0.9, SD = 2.2$ & $M = 1.1, SD = 2.6$; $F(2,119) = 6.0, p = 0.003$), and that “using PrEP would make me feel less feminine” ($M = 3.3, SD = 3.8$ vs. $M = 1.4, SD = 2.8$ & $M = 0.3, SD = 0.9$; $F(2,112) = 6.9, p = 0.001$) than both the *Community Active* and *Community Established* clusters, respectively. To a lesser extent, the *Community Unengaged* cluster also expressed greater agreement than the *Community Active* cluster with the statements “my doctor has never discussed PrEP with me so I must not need it” ($M = 4.4, SD = 3.0$ vs. $M = 2.4, SD = 3.2$; $F(2,117) = 3.2, p = 0.05$) and “the treatments for HIV are so effective that I don't really need to take PrEP to be protected” ($M = 3.6, SD = 3.6$ vs. $M = 1.5, SD = 2.9$; $F(2,118) = 3.2, p = 0.05$).

PrEP Beliefs

No significant differences were observed between clusters on item statements assessing PrEP beliefs.

Healthcare Experiences

When asked to rate their agreement with statements about experiences with healthcare, *Community Established* cluster members indicated greater agreement than both *Community Active* and *Community Unengaged* members with the statements “my doctor always explains things in a way I can understand” ($M = 8.9, SD = 2.5$ vs. $M = 6.9, SD = 3.5$ & $M = 5.5, SD = 3.8$; $F(2,118) = 6.7, p = 0.002$) and “I feel my doctor accepts and supports me completely” ($M = 9.6, SD = 1.3$ vs. $M = 7.6, SD = 3.3$ & $M = 7.1, SD = 3.1$; $F(2,114) = 6.2, p = 0.003$). *Community Unengaged* members agreed less than both the *Community Active* and *Community Established* cluster members with the statement “I am more likely to take my doctor’s advice if I feel they do not judge me” ($M = 5.5, SD = 3.6$ vs. $M = 8.7, SD = 2.4$ & $M = 8.9, SD = 2.4$; $F(2,115) = 12.2, p < 0.001$).

Patient Self-Advocacy

When asked the extent to which they agreed with statements related to patient self-advocacy, *Community Unengaged* cluster members, compared to both *Community Active* and *Community Established* members, agreed less that they actively seek out information on their health ($M = 6.7, SD = 3.2$ vs. $M = 8.7, SD = 2.3$ & $M = 9.2, SD = 1.8$; $F(2,119) = 7.1, p = 0.001$). *Community Unengaged* members also agreed more that they “don’t get what they need from their doctor” because they are not assertive enough, relative to both *Community Active* and *Community Unengaged* members ($M = 5.5, SD = 3.7$ vs. $M = 3.3, SD = 3.7$ & $M = 1.7, SD = 3.4$; $F(2, 118) = 6.9, p = 0.001$).

Discussion

Through cluster analysis, we identified three distinct subgroups within our sample of trans women, defined on the basis of their self-perceived belongingness within transgender communities. While distinct in terms of their community belongingness, these clusters were demographically comparable aside from age differences. This suggests that psychographic differences, i.e. the aggregate of their attitudes and dispositions, regarding how connected trans women feel towards trans communities may be informative when tailoring messages for PrEP promotion to this population. For example, based on these findings, trans women in the *Community Established* cluster were highly knowledgeable about PrEP, tended to have positive perceptions about PrEP and may be more likely to trust PrEP having known more trans women who have used it. Moreover, these women included the greatest proportion of individuals who had both known someone who has taken PrEP (72%), and of those, known other trans women who had taken PrEP (63%). We find the inverse to be true of those in the *Community Unengaged* cluster, who have less PrEP knowledge and a significantly smaller proportion of individuals who knew someone who had taken PrEP (35%). Importantly, community connectedness and social connection was associated with improved PrEP uptake and adherence among LGBT individuals in the iPrEx OLE study [20]. Thus, our finding that trans women differentially experience community connectedness may have implications regarding the development of tailored health messaging that aims to improve PrEP uptake and adherence among this population.

With regard to preferred communication channels, it is notable that the *Community Unengaged* cluster, though younger on average compared to other clusters, demonstrated the least preference for seeing more PrEP information on social media. This may contradict what may be commonly believed to be true among public health professionals engaged in PrEP promotion, i.e. that younger populations would be better reached through the use of social media channels such as Instagram and Twitter. Somewhat paradoxically, the most preferred communication channel among member of this cluster was found to be from transgender leaders in the community, though preference was still low when compared to other clusters presented in the analysis. These results appear to suggest that of the communication channels included in this survey, an ideal communication channel has yet to be identified for reaching trans women who are less community engaged, indicating an area where more work is required.

Age is also an important distinguishing factor among the clusters. While the cluster solution was determined by items related to community belongingness, we did find that age varied significantly between the three clusters, most notably between the *Community Established* cluster and the *Community Unengaged* cluster. Those who were *Community Established* were older on average ($M = 46$) compared to those who were *Community Unengaged* ($M = 35$) and *Community Active* ($M = 38$). This requires further interpretation in light of the divergent perceptions we observed between these two clusters. While the overall sample tended to skew older (mean age = 39 years) it is noteworthy that the younger *Community Unengaged* cluster reported lower intent to use PrEP, less PrEP knowledge and greater PrEP concerns, specifically related to PrEP use making them feel less feminine and the perception that PrEP is only for gay men. These gender-related concerns about PrEP should be further explored, particularly among younger cohorts of trans women. From a communication perspective, PrEP messaging may benefit from addressing these specific perceptions using known leaders from trans women communities. Pairing messaging with the right communication channel could be critical to reach this group about PrEP. It should also be noted that the relative low community engagement reported by this younger cluster may be attributable to social and structural barriers. Social conditions that limit the ability for individuals to participate fully in communities, such as housing instability, unemployment, and exposure to violence, are experienced at higher rates among trans women; particularly young trans women and trans women of color [29–31]. For this group, integrating PrEP messages with other needed health and social services, such as housing and employment assistance, and violence prevention may be a more effective approach than PrEP focused campaigns that appeal to trans identity exclusively.

The *Community Active* cluster requires more nuanced interpretation, in that these participants were similar to the *Community Established* cluster in all but a few significant respects. First, while not as young as the *Community Unengaged* cluster, the *Community Active* cluster was younger on average (mean age = 38). In terms of their community belongingness, the *Community Active* cluster identified sex to be more important to their experience as a trans woman relative to the other clusters. They also expressed the greatest comfort when they are around other people who are trans. It is not immediately clear whether and how these two findings are related. However, it is worth noting that women in this cluster were also less likely to think their risk of HIV was zero or almost zero.

They also indicated greater agreement with the idea of taking PrEP during times when they are having more sex. Together, these results may indicate the importance of sex positive messaging, especially if delivered by trans women peers, for whom these women demonstrated a notable preference as a communication channel. While comparable to the *Community Established* cluster in terms of PrEP knowledge and the perceived barriers and benefits of PrEP, participants in the *Community Active* did indicate less positive healthcare experiences (e.g. “I feel my doctor accepts and supports me completely”), but only by degree ($M = 7.6$ vs $M = 9.6$), since both scores indicate relatively high agreement. This also has implications for PrEP messaging. It has been well established that experiencing or anticipating stigma and discrimination in the context of healthcare can result in trans women delaying or forgoing medical care [32]. Conversely, providing healthcare in settings that are trans affirming has been shown to reduce stigma, increase healthcare utilization and lead to more effective promotion of preventative care strategies such as PrEP use among trans women [5]. In this case, ensuring that these trans affirming settings are providing PrEP messaging that aligns with a broader appeal that incorporates trans voices would be important in reaching this group.

Understanding the association between community belongingness and trust of PrEP information sources provides important context for establishing how best to target and tailor PrEP messages to different sub-groups of trans women, enabling us to more accurately develop message strategies. It also reduces potential stereotyping of trans women who have historically been seen as a subset of MSM in terms of how they think about PrEP and other HIV prevention. For example, addressing concerns such as hormone interference or facilitators like being able to engage in safer sex, which they may feel is identity empowering, would be important messages for trans women that may not be used in broader appeals for MSM. This research instead points to better ways to approach HIV prevention strategies in vulnerable, at-risk populations through health communication campaigns, materials, and interventions.

In addition, identifying sub-populations on the basis of community belongingness allows the examination of how PrEP perceptions vary among individuals who are demographically similar. These perceptual differences may be used to address the specific concerns expressed by trans women in this sample who were less community engaged, particularly with regard to PrEP being perceived as just for gay men and not feminine. For these individuals, messages that seek to promote PrEP to a population on the basis of sexual and gender identity may be less effective. More so than other communication channels, *Community Unengaged* participants demonstrated a preference for PrEP information provided by someone who is taking PrEP. Thus an alternative approach may involve providing PrEP testimonials from a diverse cross-section of patients. Understanding how community belongingness drives beliefs about PrEP and information source trust could be used in community or healthcare settings as well. Standard assessments of community belongingness could be applied to assist healthcare or case work staff to enhance their ability to communicate HIV risk and PrEP use with trans women. It can also inform the development of larger-scale PrEP communication campaigns aimed at the specific needs of trans women.

Before drawing final conclusions, there are limitations to this study that should be noted. First, our labeling of these clusters reflects only one possible interpretation of how these natural subgroups may be defined. Secondly, due to the cross-sectional nature of the data presented, no inferences regarding temporality can be made here. This is particularly worth noting with regard to the variance in age observed between the *Unengaged* and *Established* clusters. While it is possible that the perceptual differences observed between these groups mark distinct points along a trajectory of developing a community identity, without longitudinal data to support this supposition, it must be left to future studies to determine. Also, because our survey data was collected through self-report, it is possible that responses may be subject to social desirability bias, particularly to items addressing interest in using PrEP.

Conclusion

Through the use of segmentation, we were able to identify three distinct clusters of trans women that were otherwise demographically comparable. By assessing the variance in their responses to statements about PrEP and community belongingness, greater insight into their dispositions towards PrEP was gained. This has the potential to enhance PrEP promotion strategies by more effectively targeting messages to psychographically distinct segments within trans women's communities and through utilizing their preferred communication channels.

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Community Active	— · · · —
Community Established	—————
Community Unengaged	— · · —

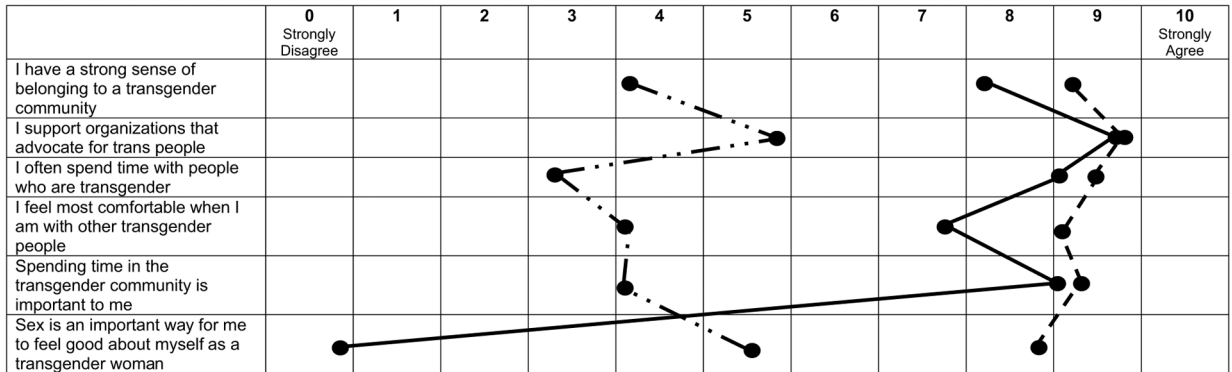


Fig. 1.
Community belonging item means plotted by cluster membership

Table 1

One-way ANOVA comparisons of perceptual item means by cluster membership

Survey Item	N = 73 (58%) community active [1] M (SD)	N = 32 (26%) community established [2] M (SD)	N = 20 (16%) community unengaged [3] M (SD)	F	p	Tukey's HSD post-Hoc comparisons		
						Significance	1-2	1-3
Trans community connectedness								
I have a strong sense of belonging to a transgender community ^{***}	9.3 (1.3)	8.3 (2.8)	4.2 (3.5)	40.9	< .001	0.07	< 0.001	< 0.001
I support organizations that advocate for trans people ^{***}	9.7 (0.76)	9.7 (1.0)	5.9 (3.0)	58.9	< 0.001	0.98	< 0.001	< 0.001
I often spend time with people who are transgender ^{***}	9.5 (1.0)	9.0 (1.8)	3.3 (2.7)	117.6	< 0.001	.28	< 0.001	< 0.001
I feel most comfortable when I am with other transgender people ^{***}	9.2 (.76)	7.8 (2.1)	4.1 (2.9)	52.1	< 0.001	.004	< 0.001	< 0.001
Spending time in the transgender community is important to me ^{***}	9.4 (1.6)	9.0 (1.8)	4.1 (3.1)	52.9	< 0.001	.60	< 0.001	< 0.001
Sex is an important way for me to feel good about myself as a transgender woman ^{***}	8.8 (1.8)	0.8 (1.3)	5.6 (3.7)	116.4	< 0.001	< 0.001	< 0.001	< 0.001
PREP communication channel								
I understand how PREP works	7.6 (3.4)	8.2 (3.3)	6.1 (3.7)	2.3	0.1	0.71	0.19	0.09
I have received enough education or counseling about PREP	6.8 (3.9)	7.8 (3.7)	5.6 (3.9)	1.9	0.2	0.46	0.46	0.13
I would trust PREP information more if it came from the same doctor that gives me my hormones [*]	7.9 (3.0)	6.9 (3.8)	5.4 (3.6)	4.2	.02	0.40	0.01	0.27
I would trust PREP information more if it came from my trans women friends	6.8 (3.5)	5.1 (3.9)	5.4 (3.3)	3.0	.06	0.07	0.31	0.94
I would trust PREP information more if it came from my non-trans friends	5.0 (3.6)	3.7 (3.5)	5.0 (3.3)	1.7	0.2	0.18	1.0	0.39
I would trust PREP information more if it came from transgender leaders in my community	7.7 (3.6)	6.6 (3.7)	5.6 (3.7)	2.9	.06	0.303	0.07	0.63
I would trust PREP information more if it came from someone who is taking PREP ^{**}	7.7 (3.4)	6.7 (3.8)	5.5 (3.8)	4.5	.01	0.21	0.02	0.42
I have a hard time understanding the information given to me about PREP	3.3 (3.1)	3.2 (4.1)	3.8 (3.7)	0.2	0.8	0.99	0.85	0.87
I want to see more information about PREP on social media ^{**}	7.8 (3.3)	8.3 (3.4)	5.4 (3.9)	4.8	0.01	0.78	0.02	0.01

Survey Item	N = 73 (58%) community active [1] M (SD)	N = 32 (26%) community established [2] M (SD)	N = 20 (16%) community unengaged [3] M (SD)	F	p	Tukey's HSD post-Hoc comparisons		
						Significance		
						1-2	1-3	2-3
PrEP benefits								
PrEP can help me from getting HIV	8.9 (2.1)	9.3 (1.7)	8.1 (3.0)	1.9	0.2	0.63	0.34	0.13
Using PrEP would make me feel more in charge of my life**	7.4 (3.2)	8.4 (2.6)	5.2 (4.3)	5.6	0.005	0.33	0.03	0.003
If I take PrEP, it is safer for me to have sex without condoms	4.2 (3.8)	3.9 (3.7)	5.2 (3.2)	0.7	0.5	0.93	0.60	0.51
I would be able to enjoy sex more if I was taking PrEP	6.6 (3.6)	7.4 (3.4)	5.7 (3.6)	1.4	0.2	0.56	0.55	0.22
During times when I'm having more sex, I would be more likely to take PrEP	7.2 (3.3)	6.5 (3.9)	5.2 (3.5)	2.4	0.1	0.68	0.08	0.40
PrEP is easy to take	8.2 (2.7)	9.1 (1.8)	7.4 (2.7)	2.6	0.08	0.26	0.47	0.07
PrEP would not interfere with me taking hormones	7.7 (3.3)	8.9 (2.7)	7.4 (3.3)	2.0	0.1	0.16	0.95	0.24
I would not have to rely on my partner to use condoms if I were taking PrEP	4.2 (3.6)	4.1 (3.6)	4.0 (3.5)	0.02	1.0	0.99	0.98	1.0
I would only have to take one pill a day if I was on PrEP**	7.9 (3.3)	8.8 (2.0)	5.8 (3.9)	4.9	0.009	0.35	0.05	0.006
I would feel closer to my partner if I was on PrEP	6.0 (3.9)	6.3 (4.1)	4.2 (3.8)	1.8	0.2	0.91	0.21	0.17
PrEP is safe and effective for trans women to use***	8.5 (2.5)	9.6 (1.3)	6.4 (3.8)	8.4	<0.001	0.14	0.009	<0.001
PrEP barriers								
PrEP is only for gay men**	0.9 (2.2)	1.1 (2.6)	3.2 (4.0)	6.0	0.003	0.89	0.002	0.02
My doctor has never discussed PrEP with me so I must not need it*	2.4 (3.2)	3.6 (4.2)	4.4 (3.0)	3.2	0.05	0.26	0.05	0.67
I worry that PrEP would make my hormones less effective	2.6 (3.3)	2.5 (3.5)	3.5 (3.1)	0.6	0.5	0.98	0.58	0.56
Taking PrEP is expensive and I couldn't afford it	3.1 (3.2)	4.1 (3.6)	4.1 (3.6)	1.3	0.3	0.33	0.51	1.0
Taking PrEP would cause too many side effects	2.8 (3.2)	3.0 (3.4)	4.0 (3.9)	0.8	0.5	0.95	0.41	0.63
I have a medical condition that would keep me from taking PrEP	2.3 (3.5)	2.4 (3.2)	3.6 (3.3)	1.1	0.3	0.99	0.30	0.45
The treatments for HIV are so effective that I don't really need to take PrEP to be protected*	1.5 (2.9)	2.2 (3.5)	3.6 (3.6)	3.2	0.05	0.59	0.04	0.30
People might think I am HIV + if they found out I am taking PrEP	3.5 (3.8)	3.2 (3.3)	3.9 (3.8)	0.2	0.8	0.95	0.89	0.80
PrEP only protects against HIV, not other sexually transmitted infections	7.3 (3.7)	8.3 (3.3)	6.6 (3.7)	1.3	0.3	0.45	0.75	0.28

Survey Item	N = 73 (58%) community active [1] M (SD)	N = 32 (26%) community established [2] M (SD)	N = 20 (16%) community unengaged [3] M (SD)	F	p	Tukey's HSD post-Hoc comparisons		
						Significance		
						1-2	1-3	2-3
I prefer to use condoms for HIV prevention instead of taking PrEP	4.5 (3.7)	4.0 (3.8)	4.4 (3.8)	0.2	0.8	0.82	0.99	0.94
Even if I take PrEP, I might get HIV anyway	4.4 (3.6)	4.3 (4.0)	4.5 (3.2)	0.01	1.0	1.0	1.0	0.99
If I was taking PrEP, I would worry about being seen with medication that are associated with HIV	3.0 (3.8)	2.2 (2.8)	3.0 (3.1)	0.7	0.5	0.48	1.0	0.71
Using PrEP would make me feel less feminine	1.4 (2.8)	0.3 (0.9)	3.3 (3.8)	6.9	0.001	0.18	0.02	0.001
PrEP beliefs								
If I use PrEP, my sex partner(s) might think I will give them HIV	2.7 (3.2)	2.6 (3.2)	2.8 (3.2)	0.03	1.0	0.98	1.0	0.98
I don't trust how effective they say PrEP is	3.4 (3.5)	3.0 (3.7)	2.7 (2.7)	0.4	0.7	0.82	0.70	0.92
I feel healthy so I don't need to take PrEP	2.2 (3.1)	1.9 (3.2)	2.7 (3.0)	0.4	0.7	0.92	0.68	0.82
I don't think PrEP really works	2.0 (3.1)	1.2 (2.5)	2.5 (2.7)	1.5	0.2	0.32	0.84	0.26
People from my race/ethnicity are more likely to need to take PrEP	4.0 (3.8)	4.3 (4.4)	2.7 (2.3)	1.4	0.3	0.92	0.32	0.26
PrEP sounds "too good to be true"	3.7 (3.7)	3.7 (3.7)	3.2 (3.5)	0.2	0.9	1.0	0.85	0.90
I'm worried I won't take PrEP correctly and then I will get HIV	3.6 (3.5)	3.0 (3.5)	2.8 (3.4)	0.6	0.6	.73	0.97	0.63
I have a lot more important worries in my life than getting HIV	3.2 (3.7)	2.7 (3.6)	2.9 (3.3)	0.3	0.8	0.75	0.92	0.98
PrEP makes people think they are invincible (like they can't get HIV or other STIs)	4.0 (3.7)	4.5 (3.5)	4.0 (3.5)	0.2	0.8	0.79	1.0	0.86
Healthcare experiences								
I don't want to talk with my doctor about my sex life	2.6 (3.6)	2.0 (3.1)	3.7 (2.9)	1.5	0.2	0.76	0.38	0.21
I am afraid I would feel judged by the doctor and other people who work in a doctor's office (like front desk staff) so I don't want to go and ask for PrEP	2.7 (3.8)	2.4 (3.7)	3.3 (3.1)	0.4	0.7	0.91	0.82	0.67
Doctors don't want to treat people like me	2.9 (3.5)	2.7 (3.6)	4.0 (3.8)	0.9	0.4	0.95	0.46	0.41
My doctor always explains things in a way I can understand	6.9 (3.5)	8.9 (2.5)	5.5 (3.8)	6.7	0.002	0.02	0.24	0.002
I feel my doctor accepts and supports me completely	7.6 (3.3)	9.6 (1.3)	7.1 (3.1)	6.2	0.003	0.006	0.74	0.01
I have had positive interactions with the staff at my doctor's office or clinic (like nurses, aides, front desk staff)	7.9 (3.2)	9.2 (2.1)	6.5 (3.6)	5.1	0.007	0.09	0.18	0.006

Survey Item	N = 73 (58%) community active [1] M (SD)	N = 32 (26%) community established [2] M (SD)	N = 20 (16%) community unengaged [3] M (SD)	F	p	Tukey's HSD post-Hoc comparisons		
						Significance		
						1-2	1-3	2-3
I'm comfortable talking with my doctor	8.1 (2.9)	8.6 (2.8)	7.4 (2.7)	1.1	0.3	0.66	0.61	0.30
I am more likely to take my doctor's advice if I feel they do not judge me***	8.7 (2.4)	8.9 (2.4)	5.5 (3.6)	12.2	< 0.001	0.92	< 0.001	< 0.001
I feel my doctor listens to me and does not rush me	7.8 (3.1)	8.9 (2.5)	7.3 (3.1)	2.1	0.1	0.20	0.81	0.16
My doctor or other healthcare provider has misgendered me	4.4 (4.3)	2.7 (4.0)	5.2 (3.7)	2.7	0.07	0.13	0.78	0.11
My provider has referred to me as a man	3.1 (3.9)	1.9 (3.3)	4.3 (3.6)	2.5	0.09	0.35	0.40	0.08
I would prefer to get PrEP from the same doctor who gives me my hormones	7.9 (3.1)	7.3 (3.6)	7.1 (3.6)	0.7	0.5	0.66	0.58	0.97
I know where to get PrEP in a gender affirming environment	7.4 (3.6)	7.1 (3.9)	6.8 (3.6)	0.2	0.8	0.93	0.79	0.95
I worry that other doctors or healthcare providers will think I'm HIV positive if I'm taking PrEP	2.7 (3.6)	1.7 (3.1)	4.1 (4.2)	2.5	0.09	0.39	0.34	0.07
Patient self-advocacy								
I actively seek out information on my health***	8.7 (2.3)	9.2 (1.8)	6.7 (3.2)	7.1	0.001	0.48	0.005	0.001
I don't get what I need from my doctor because I am not assertive enough***	3.3 (3.7)	1.7 (3.2)	5.5 (3.7)	6.9	0.001	0.09	0.04	0.001
I am more assertive about my healthcare needs than most trans women	6.9 (3.4)	7.2 (3.4)	5.0 (3.8)	2.6	0.08	0.87	0.11	0.08
If my doctor prescribes something I don't understand or agree with, I question it	7.9 (3.2)	9.1 (2.0)	7.5 (2.5)	0.8	0.5	0.12	0.87	0.14
If my doctor prescribes something I don't understand or agree with, I am likely not to take it	6.1 (4.0)	5.1 (3.8)	6.3 (3.3)	2.8	0.06	0.50	0.96	0.54
I don't always do what my doctor or healthcare worker asks me to do*	4.1 (3.8)	4.3 (3.1)	6.2 (3.0)	2.8	0.05	0.97	0.05	0.13

All item scores range 0-10

F-test significance

* p 0.05

** p 0.01

*** p 0.001

Table 2

Demographic and other characteristics of total analytic sample (n = 125) and by cluster

Sociodemographic characteristics	Total \bar{x} (n = 125) % (n), M (SD)	Community active (n = 73) % (n), M (SD)	Community established (n = 32) % (n), M (SD)	Community unengaged (n = 20) % (n), M (SD)	χ^2, F
City					
Philadelphia area	60 (75)	53(39)	66 (21)	75 (15)	3.6
San Francisco Bay area	40 (50)	47 (34)	34 (11)	25 (5)	
Age (years) **	39 (14.9)	38 (13.8)	46 (15.8)	35 (13.9)	5.1
Race/Ethnicity					
African American/Black	39 (49)	37 (27)	38 (12)	50 (10)	1.2
Hispanic/Latinx	18 (24)	22 (16)	19 (6)	5 (1)	2.9
White	33 (41)	33 (24)	34 (11)	30 (6)	0.1
API/Multiracial/Other	17 (21)	16 (12)	9 (3)	30 (6)	3.8
Education					
High school and below	40 (48)	39 (27)	36 (11)	53 (10)	1.7
Some college	30 (36)	30 (21)	32 (10)	26 (5)	
College and above	30 (36)	31 (22)	32 (10)	21 (4)	
Income					
I have enough money to live comfortably	49 (60)	45 (32)	56 (18)	50 (10)	1.6
I barely get by on the money I have	41 (51)	44 (31)	34 (11)	45 (9)	
I cannot get by on the money I have	10 (12)	11 (8)	9 (3)	5 (1)	
Health insured (yes)	90 (107)	84 (61)	94 (30)	80 (16)	2.2
Homeless or in a shelter in past 30 days (yes)	24 (29)	26 (19)	16 (5)	25 (5)	1.7
Ever exchanged sex for money/food/drugs/etc. (yes)	53 (66)	56 (41)	53 (17)	40 (8)	2.1
Perceived HIV risk					
Zero or almost zero *	46 (58)	38 (28)	56 (18)	60 (12)	5.9
Hormone use					
Currently taking hormones	73 (91)	77 (56)	72 (23)	60 (12)	1.4
PrEP items					
Intent to use PrEP (High)	65 (81)	66 (48)	72 (23)	50 (10)	2.7
Before today had you heard of PrEP? (yes)	87 (103)	84 (61)	88 (28)	70 (14)	1.6

Sociodemographic characteristics	Total [†] (n = 125) M (SD)	Community active (n = 73) (n), M (SD)	Community established (n = 32) (n), M (SD)	Community unengaged (n = 20) (n), M (SD)	χ^2 , F
If yes, have you heard of PrEP from...					
A Doctor	67 (84)	69 (50)	66 (21)	65 (13)	0.4
A Friend	62 (78)	60 (44)	75 (24)	50 (10)	3.6
Another Transwoman	55 (69)	59 (43)	59 (19)	37 (7)	4.0
A Family Member	30 (38)	36 (26)	22 (7)	25 (5)	1.9
Ever known anyone so has taken PrEP? (yes) **	64 (80)	69 (50)	72 (23)	35 (7)	9.8
Do you know any transwomen who take PrEP? (yes)	52 (65)	53 (39)	63 (20)	30 (6)	3.3
Used PrEP in the past but no longer use (yes)	34 (43)	36 (26)	28 (9)	40 (8)	0.6
PrEP Knowledge (scale = 0–7) **	6.3 (1.3)	6.4 (1.2)	6.5 (0.9)	5.4 (1.9)	5.9

* p .05

** p .01

*** p .001

[†] For expected values < 5 Fisher's Exact is reported

[‡] Average missing values across all variables is 3.3%