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# Structural Inequities and Social Networks Impact Hormone Use and Misuse Among Transgender Women in Los Angeles County

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**Abstract** In order to reduce gender dysphoria and combat stigma, transgender women often affirm their gender through social and medical transition, which may include cross-sex hormone therapy. This study examined associations between medically monitored hormone use and hormone misuse (non-prescribed hormone use including “fillers”), structural inequities (access to housing, health insurance, and income), and social network dynamics among 271 transgender women in Los Angeles. Hormone use status was coded trichotomously (hormone use, hormone misuse, no hormone use), and robust multinomial logistic regression as well as novel social network analysis was conducted to examine associations. Results demonstrated that younger, African-American/Black transgender women were most likely to engage in hormone misuse compared to transgender women who were older or non-African-American/Black. One-third of the sample reported sex work as a main source of income, and this group was more likely to misuse hormones than those with another primary source of income. Transgender women with access to stable housing and health insurance were most likely to engage in medically monitored hormone use. Social network analysis revealed that transgender women with a greater number of hormone-using network alters were most likely to misuse hormones, but that using the Internet to find

transgender friends mitigated this association. Results demonstrate the multifaceted risk profile of transgender women who use and misuse hormones, including that social networks play an important role in hormone usage among transgender women.

**Keywords** Transgender women · Hormone use · Social network · Structural inequality

## Introduction

Due to their gender expression and/or gender presentation, many transgender women (hereafter, trans women) in the U.S. face heightened experiences of interpersonal and systematic stigmatization (Hughto, Reisner, & Pachankis, 2015; James et al., 2016; Stotzer, 2009). Specifically, trans women face significantly high rates of victimization and violence, homelessness, substance use, HIV/AIDS, mental health issues and suicide, incarceration, and poverty (Bradford, Reisner, Honnold, & Xavier, 2013; Fletcher, Kisler, & Reback, 2014; MacCarthy, Reisner, Nunn, Perez-Bruemer, & Operario, 2015; Reback & Fletcher, 2014; Shelton, 2015; Stotzer, 2009; Yang, Manning, van den Berg, & Operario, 2015). The cyclical and syndemic nature (Brennan et al., 2012) of these health disparities is complex: The disparities often force trans women into street economies such as sex work to survive (Hwahng & Nuttbrock, 2007; James et al., 2016; Wilson et al., 2009), and high-risk sexual activity has been associated with worse health outcomes, including HIV infection and non-prescribed hormone use (Kurtz, Surratt, Kiley, & Inciardi, 2005; Nemoto, Bödeker, & Iwamoto, 2011).

## Hormone Use and Misuse Among Trans Women

Many trans women affirm their gender through social and medical transition (Sevelius, 2013), which often includes cross-sex

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hormone therapy (Coleman et al., 2012). However, due to economic hardship and experiences of healthcare-related stigma (Grant et al., 2011; James et al., 2016; White Hughto, Murchison, Clark, Pachankis, & Reisner, 2016), trans women are much less likely to access medical care than the general population, often leading them to obtain hormones from non-medical sources (Rotondi et al., 2013). Even trans women who do access medical care can be denied hormones: The 2015 U.S. Transgender Survey (hereafter, USTS), a convenience sample of over 27,000 transgender people, found that 25% of transgender individuals who attempted to access hormones were denied insurance coverage for transition-related hormone therapy (James et al., 2016).

Widespread non-prescribed hormone use among trans women has been documented across numerous U.S. studies (Bradford et al., 2013; Garofalo, Deleon, Osmer, Doll, & Harper, 2006; Xavier, Bobbin, Singer, & Budd, 2005). A study from New York City investigating barriers to care and hormone usage among trans women ( $N = 101$ ) found that 23% of hormone users were accessing hormones from a source that did not include a physician, including friends, lovers, and street vendors (Sanchez, Sanchez, & Danoff, 2009). While hormone use is associated with an increase in general quality of life among trans women (White Hughto & Reisner, 2016), it is also associated with numerous health risks, the most serious of which is venous thromboembolism (VTE) (Asscheman et al., 2014). Administration of ethinyl estradiol (i.e., oral estrogen) is associated with 6–8% incidence of VTE among trans women and is thus no longer prescribed by most clinics (Gooren, Giltay, & Bunck, 2008). However, trans women who use non-prescribed hormones often use excess dosing of oral contraceptives containing ethinyl estradiol (Asscheman et al., 2014), posing a major health risk. Other reported hormone side effects include elevated liver enzymes, gallstones, decrease in hemoglobin, and depression (Moore, Wisniewski, & Dobs, 2003). Trans women may also affirm their gender by feminizing their appearance through injection of soft tissue “fillers” such as oils, industrial silicones, cement glue, and automobile fluid (Poteat et al., 2015; Wilson, Rapues, Jin, & Raymond, 2014), which can result in serious complications, including blood clots, pulmonary hemorrhage, pneumonitis, loss of limb(s), and death (Styperek, Bayers, Beer, & Beer, 2013).

### Structural Inequities Among Trans Women: Income, Housing, and Health Insurance

Structural inequity is systematic inequality that is catalyzed by underlying social disadvantage (Braveman & Gruskin, 2003). Trans women face a multitude of structural inequities, including disadvantages in access to income, housing, and health insurance. Trans women are more than twice as likely as the general U.S. population to be living in poverty (James et al., 2016), often a result of discrimination in access to legal employment. Employment discrimination among trans women has been widely reported across numerous U.S. studies (Grant et al., 2011; James et al., 2016; MacCarthy et al., 2015; Xavier et al., 2005). A study from

Virginia investigating experiences of discrimination among transgender individuals ( $N = 387$ ) found that 27% of respondents had experienced employment discrimination in their lifetime (Bradford et al., 2013).

Trans women also face systematic discrimination in access to stable housing. The 2015 USTS found that 23% of respondents had experienced housing discrimination in the past year due to being transgender (James et al., 2016). A study from Los Angeles investigating homelessness and HIV risk among trans women ( $N = 517$ ) found that less than half of the participants reported being stably housed: 22.4% reported being marginally housed and 34.8% reported being homeless (Fletcher et al., 2014). Homelessness and unstable housing among trans women have both been associated with substance use, mental health issues, HIV risk, and hormone misuse (Fletcher et al., 2014; Spicer, 2010).

In concert with inequities in income and housing, trans women are also disadvantaged in access to health insurance. Across numerous U.S. studies, trans women are less likely to have health insurance than the general population, with reported prevalence of uninsured trans women ranging from 14 to 73% across diverse samples (Clements-Nolle, Marx, Guzman, & Katz, 2001; Grant et al., 2011; James et al., 2016; Kurtz et al., 2005; Reback, Simon, Bemis, & Gatson, 2001; Sanchez et al., 2009; Xavier et al., 2005) compared to 11% of the general U.S. population who are uninsured (James et al., 2016). Without access to health insurance, the aforementioned health concerns of trans women are exacerbated. Lack of health insurance in the general U.S. population is associated with lack of preventative healthcare (DeVoe, Fryer, Phillips, & Green, 2003; Sudano & Baker, 2003) and overall mortality (Wilper et al., 2009). Among trans women, the impact of not being insured is likely even more dire: In a national survey of transgender individuals ( $N = 6,450$ ), nearly half (48%) postponed or went without health care when they became ill because they did not have insurance and could not afford health care (Grant et al., 2011).

Due to the deleterious effects of structural inequities, many trans women are forced to engage in commercial sex work to gain income (Garofalo et al., 2006; Hwahng & Nuttbrock, 2007; Kurtz et al., 2005), putting them at increased risk of physical and/or sexual assault (Nemoto et al., 2011) and HIV infection (Brennan et al., 2012; Nemoto, Operario, Keatley, Han, & Soma, 2004). Trans women engaged in commercial sex work are also susceptible to illegal substance use (Reback, Lombardi, Simon, & Frye, 2005), as trans women involved in sex work may use substances to cope with psychological distress (Rekart, 2006; Wilson et al., 2009; Young, Boyd, & Hubbell, 2000). The impact of structural inequities on poor health among trans women is immense.

### Social Networks and Social Support Among Trans Women

In order to combat stigma and discrimination, trans women frequently turn to their social networks for instrumental and emotional support; often, due to discrimination from family, trans women rely

on transgender friends as their primary source of social support (Factor & Rothblum, 2008; Nemoto et al., 2011; Pinto, Melendez, & Spector, 2008). Previous studies have demonstrated the importance of social support for health and well-being, with social support among trans women consistently associated with improved mental health (Budge, Adelson, & Howard, 2013; Nemoto et al., 2011; Pinto et al., 2008).

While it is known that social support acts as a buffer against mental health issues, limited research has investigated the role of trans women's social networks in understanding health and risk behaviors. Social network analysis involving trans women has been limited in application: One study showed that trans women with larger social networks were more socially and politically active (Lombardi, 1999), while another highlighted that trans women's networks were more homophilous than the lesbian, gay, bisexual, and cisgender counterparts (Barrington, Wejnert, Guardado, Nieto, & Bailey, 2012). Further, little attention has been paid to how trans women form social networks with trans friends. A qualitative research study ( $N = 20$ ) from New York City found that low income, African-American/Black, and Hispanic/Latina trans women who sought care at a community-based clinic formed social networks with other trans women from the clinic, which led to social support and gender-focused activism (Pinto, Melendez, & Spector, 2008). Another small qualitative study ( $N = 10$ ) found that, among a social network of trans activists, the Internet served as the best forum for which to connect with each other (Shapiro, 2004). The Internet, in particular, has been an important venue for social support and network formation among LGB populations (Baams et al., 2011; Mehra, Merkel, & Bishop, 2004); however, its application to trans networks has, to our knowledge, not been explored.

Health-related social network analysis has often focused on substance use behaviors. One study from Los Angeles found that among substance-using homeless adolescents ( $N = 136$ ) social network characteristics were associated with lifetime heroin and methamphetamine use (Rice, Milburn, & Monroe, 2011). Social network analysis can be a useful tool in better understanding trans women's health and risk behaviors, specifically in relation to hormone use and misuse. Studies have shown that, among trans women, risky feminization practices, including unsupervised hormone use and injection of fillers, may be particularly social in nature, especially given the known phenomenon of "pumping parties," in which an unlicensed individual injects silicone fillers and other materials into the trans women attending the "party" (Sevelius, 2013; Styperek et al., 2013; Wilson et al., 2014).

Given the current literature, this study sought to better understand: (1) the association between structural barriers (e.g., income, housing, health insurance) to healthcare access and hormone use and misuse among trans women and (2) the association between trans women's social networks and hormone use and misuse. Given the current literature, it was hypothesized that among trans women: (1) structural barriers to healthcare would negatively impact hormone use and (2) social network homophily related to

hormone use (i.e., more individuals in one's network use hormones) would lead to greater risk of hormone misuse.

## Method

### Participants

Participants were self-identified trans women ( $N = 271$ ), regardless of their stage of social and/or medical gender transition. Inclusion criteria for study participation were: (1) current gender identity as woman or transgender woman or any other term on the trans feminine spectrum; (2) assigned the male sex on her original birth certificate; (3) 18 years of age or older; and (4) self-reported any alcohol and/or drug use (including non-medically prescribed marijuana) in the previous 6 months or self-reported condomless anal intercourse (either insertive or receptive) in the previous 6 months.

### Procedure

Data collection occurred from July 2015 through September 2016. Potential participants were recruited via study flyers distributed throughout Los Angeles County where trans women were known to congregate, by word of mouth, and in situ on the streets and in trans-specific or trans-friendly venues, and in social service agencies that provide services to trans women. Recruitment sites varied and were selected in an effort to sample from as many discrete networks as possible. All study procedures were conducted by two trained trans women research assistants. All participants were interviewed in Los Angeles County. After providing written consent, an assessment was conducted via an audio computer-assisted self-interview administered via an iPad. The study was approved by the Institutional Review Boards at Friends Research Institute and the University of California, Los Angeles. Upon completion of the assessment, all participants were compensated \$50.

### Measures

#### *Sociodemographics*

Participant sociodemographics included age, racial/ethnic identity, current housing situation, income and source of income (previous 30 days), and HIV status.

#### *Social Networks and Internet Use*

Participants provided information on their social networks, including how long ago they met the people in their network, the size of their social network(s), and the behaviors of the other individuals (i.e., alters; Wasserman & Faust, 1994) within their network(s). Germane to this analysis, participants were asked

to identify which of their social network alters used hormones as well as whether or not they used the Internet to meet trans women friends.

### *Hormone Use/Misuse*

To determine and characterize hormone use/misuse, participants were asked whether they had used hormones (either monitored or medically unmonitored) in the previous 6 months. Among those participants that reported hormone use in that time frame, a second question clarified whether hormones were received from a private doctor, county clinic, or other medical provider (subsequently coded as “medically monitored hormone use”), or whether they were acquired from a lover, friend, off the streets, or through some other non-traditional means (subsequently coded as “hormone misuse”). Participants were also asked whether they had ever injected non-hormone soft tissue fillers for gender enhancement (e.g., oils, industrial silicones; 0 = no filler use, 1 = lifetime filler use).

### **Statistical Analyses**

Means and SD were calculated for all continuous variables, while counts and their corresponding percentages were calculated for all variables measured at the categorical level. The primary outcome of interest was a trichotomized variable denoting no hormone use in the previous 6 months (coded as 0), medically monitored hormone use in the previous 6 months (coded as 1), or hormone misuse in the previous 6 months (coded as 2). Given the non-ordinal nature of this multicategory outcome, multinomial logistic regressions were employed which used medically monitored hormone use as the reference category. Analyses were run using robust calculations for the variance/covariance matrices, to limit the influence of potential outliers in the data. The proportion of each participant’s network that engaged in hormone use was calculated by placing the reported number of hormone-using alters in the numerator and dividing by all alters nominated. During the multinomial logistic regression analysis, this proportion was multiplied by 10 to scale coefficient estimates to an interpretable level (i.e., a one unit increase in the variable now denotes a ten percentage point increase in hormone usage in the participant’s social network). Coefficient estimates of the multivariable analysis are reported as adjusted relative risk ratios (Adj. RRR), which denote the predicted factor change in the relative likelihood of a given outcome relative to the reference category outcome (in this case, medically monitored hormone use) when controlling for other relevant covariates. Results were considered significant at  $\alpha \leq .05$ . All significance tests were two tailed, and all statistics were carried out using Stata v13SE.

## **Results**

### **Sociodemographic Variables**

Table 1 shows the sociodemographic variables as function of hormone group categorization. Nearly half (48.7%) of the participants reported engaging in medically monitored hormone use ( $n = 132$ ), with close to another half (41.3%) reporting no hormone use ( $n = 112$ ; 41.3%), and 10.0% ( $n = 27$ ) reported medically unmonitored hormone use (i.e., hormone misuse) in the previous 6 months. Of those who participated in any hormone use, 17% engaged in medically monitored hormone use.

Of the nine sociodemographic variables included in Table 1, seven demonstrated statistically significant group differences. Participants averaged 35.0 years of age ( $SD = 12.0$ ). There were significant differences observed across categories of hormone use and age, with those who misused hormones in the youngest age group. Most participants self-identified as people of color: either Hispanic/Latina or non-Hispanic/Latina African-American/Black. Relative to other racial/ethnic categories, African-American/Black trans women were observed to be less likely to report medically monitored hormone use and were more likely to report hormone misuse. Over one-third of participants reported being HIV positive; there were no significant differences observed in HIV serostatus across hormone use patterns. Fifteen percent of the participants reported current homelessness, and homeless participants were observed to be significantly less likely to have reported medically monitored hormone use and more likely to have reported hormone misuse than participants not currently experiencing homelessness. Most participants reported currently having health insurance; participants without health insurance were significantly more likely to have reported no hormone use or hormone misuse in the previous 6 months relative to participants with health insurance. Over half of the participants reported a monthly income of less than \$500, with higher incomes being overrepresented in the two categories denoting hormone use. One-third of the participants reported sex work as a main source of income; participants who reported hormone misuse were more likely to have reported sex work as a main source of income. On average, 7.8% of network alters in participants’ networks were perceived by those participants to be taking hormones; though prevalence rates differed across patterns of hormone use/misuse, contrasts were not significant. Slightly more than half of the participants reported using the Internet to make trans friends, though this proportion was significantly lower among participants engaging in hormone misuse (9.8%). A post hoc tetrachoric correlation matrix ( $p < .05$ ) indicated that Hispanic/Latina participants were less likely to be homeless, less likely to be insured, and more likely to use the Internet than non-Hispanic/Latina participants. Additionally, HIV-positive participants were more likely to be insured or to be highly active on the Internet than HIV-negative participants. No other significant correlations were observed.

**Table 1** Participants sociodemographics and social networks by hormone use/misuse in the previous 6 months

|  | No hormone use<br>( <i>n</i> = 112) |         | Medically<br>monitored<br>hormone use<br>( <i>n</i> = 132) |         | Hormone misuse<br>(including<br>“fillers”) ( <i>n</i> = 27) |         | Total ( <i>N</i> = 271) |        | Sig.                             |
|--|-------------------------------------|---------|--|---------|---|---------|-------------------------|--------|----------------------------------|
|  | <i>n</i> or <i>M</i>                | % or SD | <i>n</i> or <i>M</i>                                       | % or SD | <i>n</i> or <i>M</i>  | % or SD | <i>n</i> or <i>M</i>    | SD     |                                  |
| Age (in years) ( <i>n</i> = 270)                   | 37.1                                | 12.7    | 34.4   | 12.0    | 29.7  | 6.5     | 35.0                    | [12.0] | $F(2, 267) = 4.65; p = .01$      |
| Racial/ethnic identity ( <i>N</i> = 271)           |                                     |         |  |         |   |         |                         |        |                                  |
| Hispanic/Latina                                    | 48                                  | 42.1%   | 59   | 51.8%   | 7   | 6.1%    | 114                     |        | $\chi^2(4) = 11.68; p = .02$     |
| African-American/Black                             | 36                                  | 43.9%   | 31   | 37.8%   | 15  | 18.3%   | 82                      |        |                                  |
| Non-Black/non-Hispanic                             | 28                                  | 37.3%   | 42   | 56.0%   | 5   | 6.7%    | 75                      |        |                                  |
| HIV status ( <i>n</i> = 254)                       |                                     |         |  |         |   |         |                         |        |                                  |
| HIV negative                                       | 60                                  | 37.7%   | 81   | 50.9%   | 18  | 11.3%   | 159                     |        | $\chi^2(4) = 2.69; p = .61$      |
| HIV positive                                       | 43                                  | 45.3%   | 44   | 46.3%   | 8   | 8.4%    | 95                      |        |                                  |
| Unknown/refused                                    | 9                                   | 52.9%   | 7  | 41.2%   | 1   | 10.0%   | 17                      |        |                                  |
| Housing status ( <i>N</i> = 271)                   |                                     |         |  |         |   |         |                         |        |                                  |
| Not homeless                                       | 93                                  | 40.3%   | 119  | 51.5%   | 19  | 8.2%    | 231                     |        | $\chi^2(2) = 7.71; p = .02$      |
| Homeless   | 19                                  | 47.5%   | 13   | 32.5%   | 8   | 20%     | 40                      |        |                                  |
| Health care insurance ( <i>N</i> = 271)            |                                     |         |  |         |   |         |                         |        |                                  |
| Has health insurance                               | 81                                  | 37.3%   | 118  | 54.4%   | 18  | 8.3%    | 217                     |        | $\chi^2(2) = 14.45; p \leq .001$ |
| Does not have health insurance                     | 31                                  | 57.4%   | 14   | 25.9%   | 9   | 16.7%   | 54                      |        |                                  |
| Income (previous 30 days) ( <i>n</i> = 251)        |                                     |         |  |         |   |         |                         |        |                                  |
| ≤ \$50   | 19                                  | 46.3%   | 21   | 51.2%   | 1   | 2.4%    | 41                      |        | $\chi^2(12) = 22.89; p = .03$    |
| \$51–\$249   | 31                                  | 44.3%   | 33   | 47.1%   | 6   | 8.6%    | 70                      |        |                                  |
| \$250–\$499  | 18                                  | 47.4%   | 18   | 47.4%   | 2   | 5.3%    | 38                      |        |                                  |
| \$500–\$999  | 19                                  | 31.2%   | 31   | 50.8%   | 11  | 18.0%   | 61                      |        |                                  |
| \$1000–\$2999                                      | 13                                  | 46.4%   | 14   | 50.0%   | 1   | 3.6%    | 28                      |        |                                  |
| \$3000–\$4999                                      | 3                                   | 25.0%   | 8  | 66.6%   | 1   | 8.3%    | 12                      |        |                                  |
| ≥ \$5000   | 0                                   | 0.0%    | 0  | 0.0%    | 1   | 100.0%  | 1                       |        |                                  |
| Income source ( <i>n</i> = 270)                    |                                     |         |  |         |   |         |                         |        |                                  |
| Sex work as main source of income                  | 35                                  | 39.3%   | 37   | 41.6%   | 17  | 19.1%   | 89                      |        | $\chi^2(2) = 12.55; p = .002$    |
| Sex work not main source of income                 | 76                                  | 42.0%   | 95   | 52.5%   | 10  | 5.5%    | 181                     |        |                                  |
| Social networks and Internet use ( <i>N</i> = 271) |                                     |         |  |         |   |         |                         |        |                                  |
| Percent of social network using hormones           | 9.1%                                | 2.0%    | 6.0%   | 1.6%    | 11.5%   | 1.9%    | 7.8%                    | [1.8%] | $F(2, 266) = 1.51; p = .22$      |
| Uses Internet to find trans friends                | 49                                  | 34.3%   | 80   | 55.9%   | 14  | 9.8%    | 143                     |        | $\chi^2(2) = 6.92; p = .031$     |

### Medically Monitored Hormone Use Versus No Hormone Use

Table 2 shows the sociodemographic and social network variables as predictors of no hormone use and hormone misuse relative to medically monitored hormone use. Robust multinomial logistic regression analysis revealed that when compared to participants who reported medically monitored hormone use in the previous 6 months, participants who reported no hormone use were older, less likely to identify as African-American/Black or Hispanic/Latina ( $p = .053$ ) and were significantly more likely to be uninsured. Additionally, the predicted odds of reporting no hormone use were reduced by approximately half relative to the reference category (i.e., medically monitored hormone use) if

the participant reported using the Internet to find trans friends (Adj. RRR 0.51; 95% CI 0.27–0.97).

### Medically Monitored Versus Unmonitored Hormone Use

When compared to participants who reported medically monitored hormone use (Table 2), participants who reported hormone misuse were showed significant differences across six of nine variables analyzed: They were more likely to have reported greater proportions of their network alters using hormones, were more likely to identify as African-American/Black, were more likely to have reported current homelessness, were less likely to have reported having health insurance, and were more likely to

**Table 2** Contrasts between hormone nonuse and hormone misuse relative to medically monitored hormone use through robust multinomial logistic regression; sociodemographics, social networks, and internet use ( $n = 249$ )

|   | No hormone use (relative to medically monitored hormone use) |           |            | Hormone misuse (relative to medically monitored hormone use) |            |            |
|---|--|-----------|------------|--|------------|------------|
|   | Adj. RRR   | 95% CI    | Sig.       | Adj. RRR   | 95% CI     | Sig.       |
| <b>Social networks and Internet use</b>                                 |  |           |            |  |            |            |
| Hormone use by network alters ( <i>1 unit increase = 10% increase</i> ) | 1.17   | 0.86;1.60 | $p = .322$ | <b>1.88</b>  | 1.28;2.76  | $p = .001$ |
| Use of Internet to find trans friends                                   | <b>0.51</b>  | 0.27;0.97 | $p = .040$ | 0.88   | 0.25;3.06  | $p = .844$ |
| Age (in years)  | 1.02   | 1.00;1.05 | $p = .053$ | 0.97   | 0.92;1.03  | $p = .295$ |
| <b>Racial/ethnic identity</b>   |  |           |            |  |            |            |
| African-American/Black  | <i>Ref. cat.</i>   |           |            | <i>Ref. cat.</i>   |            |            |
| Hispanic/Latina   | 0.57   | 0.28;1.17 | $p = .124$ | <b>0.16</b>  | 0.04;0.67  | $p = .013$ |
| Non-Black/non-Hispanic  | 0.48   | 0.23;1.01 | $p = .053$ | <b>0.28</b>  | 0.08;0.99  | $p = .048$ |
| <b>HIV status</b>   |  |           |            |  |            |            |
| HIV positive  | 1.10   | 0.61;2.00 | $p = .752$ | 0.67   | 0.18;2.49  | $p = .550$ |
| <b>Homelessness</b>   |  |           |            |  |            |            |
| Yes   | 1.53   | 0.63;3.73 | $p = .347$ | <b>5.04</b>  | 1.20;21.15 | $p = .027$ |
| <b>Health insurance</b>   |  |           |            |  |            |            |
| None  | <b>4.14</b>  | 1.85;9.30 | $p = .001$ | <b>7.48</b>  | 1.83;30.59 | $p = .005$ |
| <b>Income</b>   |  |           |            |  |            |            |
| Greater than the sample average   | 0.75   | 0.42;1.37 | $p = .357$ | <b>6.08</b>  | 1.61;22.97 | $p = .008$ |
| Sex work as main source of income                                       | 0.82   | 0.43;1.56 | $p = .543$ | 2.47   | 0.81;7.52  | $p = .112$ |
| <b>Social network variables interaction effect</b>                      |  |           |            |  |            |            |
| Hormone use by network alters * use of internet to find trans friends   | 0.93   | 0.64;1.36 | $p = .682$ | <b>0.58</b>  | 0.36;0.96  | $p = .034$ |

Bold values indicate statistical significance at  $p < 0.05$

have reported an income higher than the sample average (all  $p < .05$ ). A significant interaction was also observed between the proportion of perceived hormone users in the social network and seeking trans friends through the Internet. Examination of predicted probabilities post-estimation revealed that the tendency to seek trans friends on the Internet was protective against hormone misuse for those participants that reported higher proportions of hormone-using alters in their social network(s).

### Non-Hormone (i.e., Fillers) Injections

Table 3 details parallel exploratory post hoc analyses of participant non-hormone (i.e., fillers) injections for gender enhancement. This analysis revealed only two significant associations: participant age and racial/ethnic identity. Trans women who reported engaging in non-hormone injections for gender enhancement were significantly older ( $M = 42.7$  years;  $SD = 11.8$ ) than trans women who did not report such injections ( $M = 33.1$  years;  $SD = 11.3$ ;  $F(1, 268) = 31.27, p \leq .0001$ ). Additionally, post hoc sensitivity analysis revealed the proportion of Hispanic/Latina trans women who reported non-hormone injections for gender enhancement (38/114; 33.3%) was significantly greater than among non-Hispanic/Latina trans women (17/157; 10.8%;  $\chi^2(1) = 20.68, p < .001$ ).

### Discussion

This study investigated the role of structural inequities (access to income, housing, and health insurance) and social network dynamics on hormone use and misuse among a sample of 271 trans women in Los Angeles County. The findings demonstrated that risk behaviors for non-prescribed hormone use differed in concert with sociodemographic and structural factors as well as social network dynamics. These findings shed light on the cultural, structural, and social nuances that can contribute to the design of health interventions related to safe gender transition, and these findings also highlight the usefulness of social network analysis as a methodology in better understanding hormone risks among trans women.

### Sociodemographics

Racial/ethnic differences were associated with hormone use and misuse and non-hormonal filler use. African-American/Black trans women had the highest risk of hormone misuse (18.3%) compared to Hispanic/Latina and non-African-American/Black/non-Hispanic/Latina trans women (6.1 and 6.7%, respectively); a finding supported by research that has shown that African-American/Black trans women's engagement in greater risk behaviors might be attributed to syndemic and additive experiences of stigma through their double-minority status compared to non-African-

**Table 3** Robust logistic regression of non-hormone injection (i.e., “fillers”) use on participant sociodemographics, social networks, and Internet use ( $n = 249$ )

|   | Non-hormone injections |            |            |
|---|------------------------|------------|------------|
|   | Adj. OR                | 95% CI     | Sig.       |
| Social networks and Internet use  |                        |            |            |
| Hormone use by network alters ( <i>1 unit increase = 10% increase</i> ) | 1.18                   | 0.86;1.60  | $p = .301$ |
| Use of Internet to find trans friends                                   | 1.43                   | 0.65;3.16  | $p = .375$ |
| Age (in years)  | <b>1.08</b>            | 1.05;1.11  | $p < .001$ |
| Racial/ethnic identity  |                        |            |            |
| African-American/Black  | <i>Ref. cat.</i>       |            |            |
| Hispanic/Latina   | <b>4.34</b>            | 1.54;12.26 | $p = .006$ |
| Non-Black/non-Hispanic  | 1.02                   | 0.31;3.35  | $p = .970$ |
| HIV status  |                        |            |            |
| HIV positive  | 0.85                   | 0.38;1.92  | $p = .694$ |
| Homelessness  |                        |            |            |
| Yes   | 1.58                   | 0.39;6.43  | $p = .521$ |
| Health insurance  |                        |            |            |
| None  | 1.21                   | 0.49;3.00  | $p = .688$ |
| Income  |                        |            |            |
| Greater than the sample average   | 1.46                   | 0.71;2.99  | $p = .305$ |
| Sex work as main source of income                                       | 2.11                   | 0.99;4.54  | $p = .054$ |
| Social network variables interaction effect                             |                        |            |            |
| Hormone use by network alters * use of Internet to find trans friends   | 0.74                   | 0.48;1.14  | $p = .176$ |

Wald  $\chi^2(22) = 38.28$ ;  $p < .0001$ ; pseudo  $R^2 = 0.2033$

Bold values indicate statistical significance at  $p < 0.05$

American/Black trans women (Sevelius, Reznick, Hart, & Schwarcz, 2009). Furthermore, numerous U.S. studies have demonstrated that African-American/Black trans women were more likely to engage in sex work compared to non-African-American/Black trans women (Herbst et al., 2008; Nemoto et al., 2011; Wilson et al., 2009). Participants who reported hormone misuse were more likely to have also reported sex work as a main source of income. Hormone misuse can be associated with monetary gain among sex workers, as some clients will pay extra for trans women with a feminized gender presentation.

Hispanic/Latina trans women, in contrast, were at increased risk for non-hormone filler injections (33.3%) compared to non-Hispanic/Latina trans women (10.8%). Hispanic/Latina trans women use the Spanish term “curandera” for gatekeepers of non-Western medical knowledge, including issues related to safe non-hormone filler injectables; the health risks of which are immense and include blood clots, pulmonary hemorrhage, pneumonitis, loss of limb(s), and death (Styperek, Bayers, Beer, & Beer, 2013). Due to the cultural phenomenon of curandera gatekeepers, particularly in southwestern regions such as Los Angeles County, Hispanic/Latina trans women may have a stronger network for accessing knowledge about safe non-hormone fillers; however, further research investigating the impact of curanderas on medical knowledge among Hispanic/Latina trans women is required.

Age differences among trans women also influenced hormone use, misuse, and non-hormonal filler use. Younger trans women were more likely to misuse hormones than older trans women, while older trans women were more likely than younger trans women to use non-hormone filler injections to enhance their gender presentation. In concert with these age-related findings, a study investigating filler use among trans women in San Francisco ( $N = 233$ ) found that trans women using fillers were most likely to be over age 30, with zero participants ages 18–29 reporting filler use (Wilson et al., 2014). In comparison with older trans women, who may be further along in their gender transition, younger trans women may be focused primarily on hormonal transition before accessing surgical procedures or non-hormone filler injections. Additional research is needed to better understand age-related associations on non-medically monitored gender enhancement procedures. Sociodemographic findings highlighted that both racial/ethnic identity and age played a role in understanding hormone misuse and non-hormone filler use among trans women.

### Structural Factors

The greatest percentage of trans women engaged in safe, medically monitored hormone was among participants who reported less structural obstacles to good health, including both stable housing



and healthcare insurance. These results have been supported by numerous studies that have shown that trans women who are stably housed and who have access to health insurance have lower health risk behaviors and better health outcomes (Fletcher et al., 2014; James et al., 2016; Sanchez et al., 2009; White Hughto et al., 2016; Xavier et al., 2005). An interesting finding that highlighted the complexity of structural factors was that higher income was associated with non-prescribed hormone use; with long waiting times for clinics, bureaucratic obstacles, and widespread reports among trans women of gender-related discrimination from healthcare providers (Poteat, German, & Kerrigan, 2013; Sevelius, Patouhas, Keatley, & Johnson, 2014), it may simply be easier for trans women with higher income to purchase hormones from street networks rather than through medical channels. Source of income also played a role in both hormone misuse and non-hormone filler injections; of 27 trans women who reported hormone misuse and/or non-hormone filler injections, 17 also reported sex work as their primary source of income. This finding was expected given prior research that demonstrated that trans women involved in sex work were more prone to enhance their gender presentation for both monetary gain and gender affirmation (Nuttbrock et al., 2009; Sevelius, 2013; Sevelius et al., 2009). Structural findings have illuminated the need for interventions linking trans women without stable housing or healthcare insurance to transition-related medical care. Furthermore, these findings highlight that for trans women who experienced structural inequities, higher income alone was not necessarily associated with better health risk profiles, and that sex work played a unique role in determining risk.

### Social Network Dynamics

In addition to sociodemographic and structural factors, social network dynamics also contributed to the risk for gender enhancement behaviors among trans women. Trans women who used the Internet to find trans friends were more likely to have used medically monitored hormones than to avoid hormones or to misuse hormones. One thought is that trans women who use the Internet to find trans friends also use the Internet to gain health-related information regarding their gender enhancement process. While there currently is a paucity of research investigating the role of the Internet in health-seeking behaviors among trans women, studies with sexual minority men and people living with HIV have highlighted that the Internet is a useful tool for gaining health-related information and often fills an unmet need for health information among vulnerable populations (Holloway et al., 2014; Kalichman, Benotsch, Weinhardt, Austin, & Luke, 2002; Kalichman et al., 2006; Mustanski, Lyons, & Garcia, 2011). Networks of trans women who have found friendship through the Internet likely have greater access to health information than trans women who do not use the Internet to find trans friends.

These findings also demonstrated that trans women with a greater number of network alters who used hormones, either

medically monitored or unmonitored hormone misuse, were themselves more likely to misuse hormones. The theory of social network homophily states that similarity of network alters can prohibit individuals from adopting healthy behaviors by forcing less healthy individuals to primarily interact with each another (Centola, 2011). Due to the importance of social support and strong friendship networks in the lives of trans women (Factor & Rothblum, 2008; Nemoto et al., 2011; Pinto et al., 2008), network dynamics may have particular influence on the health of trans women. Specifically, trans women who are surrounded by trans women in their social networks who use hormones to enhance their gender presentation may be more likely to access hormones by any means necessary, including without a medical prescription, in order to fit in with network alters. However, the exception was that using the Internet to find trans friends was protective against the tendency to misuse hormones among trans women with a higher number of network alters who use hormones. The protective influence of alters met on the Internet highlighted that health information found online or disseminated via online networks may have a strong influence on health-seeking behaviors among trans women, potentially over-and-above in-person social network dynamics. Another potential reason for interpreting this protective association may be that trans women were more likely to find trans friends online who were more diverse than their alters and, thereby, disrupt the influence of network homophily on hormone misuse. Future research on the influence of social network structure and Internet use on health behaviors among trans women is necessary to better understand these dynamics.

### Limitations and Conclusions

These data were limited in the self-report nature of the survey (e.g., potential recall bias, social desirability bias) and sample bias given the highly stigmatized and hard-to-reach nature of the population. Participants were recruited from Los Angeles County and may not be representative of trans women in other regions of the U.S. who may show starkly different risk profiles than the trans women in this study. However, the study recruited a large, diverse sample of trans women, with findings elucidating the impact of structural factors and social network dynamics on gender enhancement risk behaviors, of which very little is currently known.

These findings have demonstrated that younger, African-American/Black trans women were at increased risk of misusing hormones, while older, Hispanic/Latina trans women were at increased risk of using non-hormone filler injections. Furthermore, trans women who misused hormones or non-hormone fillers were also more likely to have reported sex work as a main source of income. In sum, the risk of filler injection use was explained by three factors: age, Hispanic/Latina ethnic identity, and sex work as a primary source of income. Additionally, structural inequities impacted these risk profiles. Trans women who did not have stable housing and who lacked health insurance were at

greater risk of misusing hormones, but higher income did not mitigate hormone misuse. Through novel social network analysis, these findings demonstrated that trans women who had a greater number of alters who used hormones were at increased risk of misusing hormones, but trans women who used the Internet to find trans friends were at reduced risk of hormone misuse.

Findings from this study highlighted that health initiatives and risk-reduction interventions designed for working with trans women must attend to hormone misuse and non-hormone filler use. Trans women who are homeless or marginally housed, who do not have access to health insurance, or who participate in sex work should be targeted for interventions addressing safe gender transition. Furthermore, Internet and online applications may be useful in helping trans women navigate health-related information related to gender transition. Social network dynamics should not be overlooked when implementing health interventions with trans women, and peer health navigators may be key for trans women to develop healthy social networks throughout their gender transition. Without including a focus on hormone options for gender transition in educational and health interventions, a vital component of trans women's health and safety could be overlooked and disregarded.

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