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## **An examination of demographic characteristics, components of sexuality and gender, and minority stress as predictors of excessive alcohol, cannabis, and illicit (noncannabis) drug use among a large sample of transgender people in the United States**

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Studies in the United States (U.S.) have found an increased risk for substance use among lesbian, gay, and bisexual (LGB) people (Cochran, Ackerman, Mays, & Ross, 2004; Hughes, Szalacha, & McNair, 2010; Lee, 2010; McCabe, Hughes, Bostwick, West, & Boyd, 2009). Stressors specific to LGB individuals are linked to an increased risk of substance use (Hatzenbuehler, 2009; Hatzenbuehler, Phelan, & Link, 2013; Meyer, 2003). The aim of our study is to examine substance use and its association to stressors specific to transgender individuals; a group of individuals whose gender identity and expression does not follow stereotypic gender constructs associated with their respective sex (Bockting, 2009; Bockting et al., 2013).

Minority stress theory posits that there are stressors specific to sexual minorities (e.g., LGB people) that lead to risk behaviors and poor health outcomes (Bränström, Hatzenbuehler, Pachankis, & Link, 2016; Hatzenbuehler, 2009; Hatzenbuehler et al., 2013; Herek, 2009; Meyer, 1995, 2003). These minority stressors include: enacted stigma (experiences of discrimination and rejection), internalized stigma (feelings of shame and self-devaluation), and social stigma (awareness of prejudice). Hendricks and Tesla (2012) extended the theory on minority stress beyond sexual orientation to include the stressors specific to transgender individuals. The gender minority stress framework extends minority stress theory by incorporating gender identity and expression as unique constructs that interact with sociocultural expectations. The gender minority stress framework proposes that individuals whose gender identity and expression are incongruent with the sociocultural expectations are at increased odds of experiencing minority stressors and directly influence poor health

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### **Conflict of Interest**

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outcomes compared to their cisgender counterparts (Hughto, Reisner, & Pachankis, 2015). The term *cisgender* refers to individuals who are nontransgender, otherwise individuals whose gender identity and gender expression are consistent with sociocultural expectations associated with their sex assigned at birth (Dargie, Blair, Pukall, & Coyle, 2014; Flentje, Bacca, & Cochran, 2015).

Findings from the U.S. suggest that transgender individuals experience higher rates of stigma and discrimination than cisgender individuals and provides support for the gender minority stress framework (Martin-Storey & August, 2015; Shipherd, Maguen, Skidmore, & Abramovitz, 2011). One study using data collected in the U.S. estimated that 98% of transgender individuals reported one or more traumatic events in their lifetime, relative to 56% of cisgender women and men from the general population (Shipherd, Maguen, Skidmore, & Abramovitz, 2011). Research from Hungary found that transgender people had more negative self-evaluations and evidence of greater internalized stigma than did cisgender individuals (Simon, Zsolt, Fogd, & Czobor, 2011). Among transgender individuals, minority stress is associated with increased depressive symptoms and with behaviors that increase risk for HIV infection (Bockting, Miner, Swinburne Romine, Hamilton, & Coleman, 2013; Sugano, Nemoto, & Operario, 2006).

Results of studies among transgender individuals living in urban settings in the U.S. suggest that excessive alcohol and drug use among transgender people are high. However, many of these samples are limited by selection bias toward transgender women who are racial or ethnic minorities (Benotsch et al., 2013; Hotton, Garofalo, Kuhns, & Johnson, 2013; Nemoto, Operario, Keatley, Han, & Soma, 2004; Reback, 2001; Santos et al., 2014; Sevelius, 2013). In one probability-based sample that compared binge drinking between transgender ( $n = 131$ ) and cisgender individuals ( $n = 28,045$ ), no significant differences were found between the two groups living in the state of Massachusetts (Conron, Scott, Stowell, & Landers, 2012). Most recently, a secondary data analysis of 3,458 surveys from transgender individuals suggested that 26.3% of the sample misused substances to cope with family rejection related to gender identity (Klein & Golub, 2016).

To date, the associations between substance use, sexual orientation, gender identity and expression, and minority stress have not been empirically studied among transgender individuals (Flentje, Bacca, & Cochran, 2015). Our study contributes to the literature by reporting the rates of excessive alcohol, cannabis, and illicit (noncannabis) drug use among a large sample of transgender individuals living in the U.S. We also examine sexual and gender minority stressors and their associations to excessive alcohol, cannabis, and illicit drug use.

We hypothesized that among a sample of transgender individuals, sexual and gender minority characteristics and stressors would predict substance use. Specifically, we hypothesized that among transgender people: 1) sexual and gender minority identity and expression (e.g., a nonheterosexual orientation, presenting part-time in the affirmed gender, and gender dysphoria) would be associated with increased odds for excessive alcohol, cannabis, and illicit drug use; and 2) sexual and gender minority stress would account for the

associations between sexual and gender minority identity and expression and excessive alcohol, cannabis, and illicit drug use.

## Methods

### Data Collection and Study Procedures

We utilized data from a study conducted in 2003. The original study used a cross-sectional internet-based design focused on HIV prevention among a diverse sample of transgender people in the U.S. (Rosser, Oakes, Bockting, & Miner, 2007). In the original study, participants were recruited through purposive sampling by recruiting respondents on transgender-specific websites (e.g., online community/discussion forums, dating sites). Eligibility criteria included: self-identifying as transgender, 18 years of age, and living in the U.S. Participants of the original study were paid \$30 if their data were valid (i.e., nonduplicated). The Institutional Review Board at the University of Minnesota approved the original study.

Participants in the original study completed the survey within 50 – 60 minutes. Surveys were flagged and manually screened for improbable or duplicated data. Data were considered invalid or duplicated if the surveys were completed in less than 30 minutes; if Internet Protocol (IP) addresses, ZIP codes, date of birth, age, and user names were repeated; and if the data were inconsistent (e.g., age did not match date of birth).

**Our study**—Our study utilized archival data from 2003 and found a total of 1,229 cases to be valid. Of these, nine (< 1%) cases were removed due to an “asexual” orientation, and ten cases were removed due to a significant nonresponse rate. This left a total of 1,210 cases that were used in the data analysis. An analysis of missing data (Graham, 2009) suggested that there were no significant patterns between predictor variables and missing data,  $\chi^2 = 10.24$ ,  $p = .22$ .

### Predictor Variables

**Demographic characteristics**—The survey from the original study used questions adapted from the 2000 U.S. Census to determine participants’ age, annual household income, race and ethnicity, education, and relationship status. Self-reported sex assigned at birth and current gender identity and expression were used to classify participants into the categories of “transgender” women or men.

### Components of sexuality and gender

**Self-reported sexual orientation:** The survey in the original study included questions related to sexual orientation, gender dysphoria, and time spent living in the gender expression most congruent with participant’s gender identity. Self-identified sexual orientation was assessed with the question, “How would you describe your current sexual orientation?” Participants were provided with the option to select one of the following responses: “lesbian (homosexual),” “gay (homosexual),” “bisexual,” “straight (heterosexual),” and “other, please describe.” Those participants who selected “other” were provided with an open text box to expand on their selection. In total, approximately 25%

reported a sexual orientation of “other.” Subsequently, a content analysis was conducted on the responses and indicated that the most frequent responses were: “queer,” “pansexual,” and “omnisexual.” These responses were collapsed to make a “pansexual or queer self-identification” category in order to capture a sexual orientation characterized by attraction toward other individuals, regardless of their gender identity or biological sex.

**Gender dysphoria:** In order to quantify gender dysphoria, defined as incongruence between one’s assigned sex at birth and current gender identity (Bockting, 2009), participants were asked, “How comfortable are you currently with the sex you were assigned at birth?” They responded to this single item on a 7-point Likert-scale (1 = *Very uncomfortable* to 7 = *Very comfortable*). Subsequently, gender dysphoria was dichotomized based on participants’ responses. Those who scored 4 (*Neutral*) or higher were classified as not experiencing significant gender dysphoria (coded as 0); those who scored 3 or lower were classified as experiencing significant gender dysphoria (coded as 1). The test-retest reliability ( $n = 20$ ) estimate for the single item was .85 over a one-week period.

**Affirmed gender expression:** “To what extent do you currently live in the female [or male] gender role?” assessed gender expression incongruence, defined as the amount of time participants spent living in their affirmed gender identity. Responses to the single item were on a 7-point Likert scale (1 = *Not at all* to 7 = *Full-time*). The variable was dichotomized into “non-fulltime” (responses from 1 to 6 were coded as 0) and “full-time” (a response of 7 was coded as 1). The decision to dichotomize this variable was based on research that demonstrated significant differences across outcome variables among transgender individuals associated with the amount of time spent living in their gender identities (Budge, Adelson, & Howard, 2013; Gonzalez, Bockting, Beckman, & Durán, 2012).

### **Gender minority stressors**

**Enacted stigma:** A 10-item measure within the survey assessed participants’ experiences with enacted stigma (experiences of discrimination and rejection; Clements-Nolle, Marx, & Katz, 2006). The measure asked participants to endorse which, if any, of the following enacted stigma events they experienced as a result of being transgender or due to their gender presentation: problems with obtaining a job, loss of a job, problems with obtaining or retaining housing, difficulties receiving HIV prevention services, difficulties receiving alcohol or drug treatment, difficulties receiving health services, being physically abused or beaten, being sexually abused or assaulted, or being arrested. For example, one item asked, “Have you ever experienced problems with obtaining a job and thought it was because of your transgender identity or gender presentation?” All responses to the items were dichotomous (*No* coded as 0, and *Yes* coded as 1). A mean score was obtained by dividing the sum of the responses by the number of completed items; higher scores indicated more frequent experiences of enacted stigma. The test-retest reliability ( $n = 20$ ) for the ten items was .79 over a one-week period.

**Internalized stigma:** Among transgender people, internalized stigma was defined as discomfort with one’s transgender identity (Bockting, Miner, Swinburne Romine, Hamilton, & Coleman, 2013). The Transgender Identity Survey (Bockting, Miner, Robinson, Rosser, &

Coleman, 2014) is a 26-item measure that was included in the survey to assess respondents' level of comfort or discomfort with their transgender status during the three months prior to participating in the study. The instrument provided participants with a 7-point Likert scale (1 = *Strongly disagree* to 7 = *Strongly agree*) to use in order to respond to statements such as, "Being perceived as transgender by others is okay for me," and "I sometimes feel that being transgender is embarrassing." The mean total score indicated the level of internalized stigma. A lower score suggested greater personal comfort with the respondent's transgender identity; a higher score suggested more discomfort, or greater internalized stigma. In our sample, the internal consistency estimate for the Transgender Identity Survey was .72.

**Social stigma:** The Stigma-Consciousness Questionnaire (Pinel, 1999) is a 10-item instrument used to measure awareness of social stigma. For our study, the instrument was modified to assess participants' perceived awareness of social stigma related to their transgender identity. Participants utilized a 7-point Likert scale (1 = *Strongly disagree* to 7 = *Strongly agree*) to respond to items such as, "My being transgender does not influence how people who are not transgender act with me," and "Most people view transgender people as equals." Responses were recoded if they required reverse scoring. The mean total score was used to represent the social stigma score. Lower scores indicated participants' perception of less social stigma; higher scores indicated more social stigma. The internal consistency estimate for the modified version of the Stigma-Consciousness Questionnaire in our study was .77.

### Outcome Variables

In the original study, a modified version of the Risk Behavior Assessment from the National Institute on Drug Abuse (Dowling-Guyer et al., 1994) was utilized to quantify the use of the following substances during the three months prior to participating in the study: alcohol, cannabis, crack, cocaine, heroin, speedball, nonprescription methadone, nonprescription opiates, nonprescription amphetamines, downers, peyote, hallucinogens, and ecstasy. For our study, substances were grouped into the following three categories: "excessive alcohol," "cannabis," and "illicit drugs." In previous studies, the internal consistency estimate for the Risk Behavior Assessment was found to be adequate (Dowling-Guyer et al., 1994; Needle et al., 1995).

**Excessive alcohol use**—We defined excessive alcohol use as the consumption of four or more alcoholic drinks in a single day within the past three months. This definition was based on research that recommended excessive drinking be defined as consuming four or more alcoholic drinks for women and five or more alcoholic drinks for men in a single day or sitting (Wechsler & Nelson, 2001). Given that the distinction between using four versus five drinks among women and men is still in question (Dawson, 2011; Goldstein, Dawson, Chou, & Grant, 2012; Hasin, Stinson, Ogburn, & Grant, 2007), and due to the lack of published studies that examine the consumption of alcohol among transgender individuals, our study utilized the minimum criteria of four drinks to indicate excessive alcohol use.

**Cannabis use**—Participants responded to the following question regarding cannabis use: "In the last three months, how many days did you use marijuana or hashish (weed, grass,

reefers)?" Responses that indicated using cannabis at least one day within the three months prior to completing the survey were coded as 1. For our study, responses that denied any cannabis use were coded as 0.

**Illicit drug use**—Participants were asked, "How many days did you use [crack, cocaine, heroin, speedball, nonprescription methadone, nonprescription opiates, nonprescription amphetamines, downers, peyote, hallucinogens, and ecstasy] in the last three months?" Each drug was displayed to the participant, one at a time. For our study, responses were coded as 0 if the participant denied any use of the drug. Participants who reported one or more days of using illicit drug(s) within past three months were coded as 1.

## Statistical Analyses

**Preliminary data analysis**—To evaluate differences among transgender women and men, we utilized R (a statistical software; R Core Team, 2013) and employed the nonparametric tests,  $\chi^2$  and Mann-Whitney U; all tests were two-tailed. Demographic characteristics that were found to be significantly different between transgender women and men were included as covariates in subsequent statistical analyses. Analysis of covariance was utilized to determine differences (while controlling for covariates) among transgender women and men.

**Data analysis**—Three hierarchical logistic regressions (using forced-entry of predictors) were implemented to examine how demographic characteristics, components of sexuality and gender, and minority stress predicted excessive alcohol use, cannabis use, and illicit drug use. The first step for each regression contained demographic covariates (e.g., age, income, race or ethnicity, and relationship status). The second step included the components of sexuality and gender (e.g., sexual orientation, time spent living in gender expression congruent with gender identity, and gender dysphoria). Finally, the third step contained variables related to minority stressors (e.g., enacted stigma, internalized stigma, and social stigma). The Hosmer-Lemeshow goodness of fit statistic was used to determine how well our models fit the data; for the Hosmer-Lemeshow statistic, *p* values greater than .05 were used as indicators that the models were consistent with the data. Odds ratios (*ORs*) were used as the measure of association and adjusted *ORs* were utilized to report *ORs* that controlled for variables in antecedent regression steps; *p* values less than .05 indicated statistical significance. In order to facilitate the interpretation of significant *ORs* below 1.0, inverse odds ratios were utilized.

## Results

### Sample Characteristics

Table 1 presents descriptive characteristics and the statistical differences on predictors and outcomes (controlling for demographic characteristics) between transgender women and men. Overall, 58% of the participants were transgender women and over 90% of the participants were 50 years or younger (Table 1). The majority (78%) reported being White (non-Latina/o), 2.7% were African-American, 1.3% were Asian-American, 1.3% were Native-American, 1.7% were Latina/o, and 14.5% identified as multiracial. Approximately



half (48.7%) of the total sample reported completing some college. Over half (56%) of the total sample reported being in a romantic relationship. Except for racial and ethnic minority status, there were significant differences between transgender women and men across all other demographics (Table 1). Approximately 74% of the total sample identified as nonheterosexual. There were significant differences on self-reported sexual orientation between transgender women and men, with higher rates of transgender women identifying as bisexual (35.9%) and transgender men identifying as pansexual or queer (36.9%). Overall, the majority of our sample (68.1%) reported living part-time in their affirmed gender identity, and 68.7% also reported gender dysphoria (Table 1). Gender minority stressors were statistically different (Table 1) and more frequently endorsed among transgender men than transgender women (Table 2). Specifically, transgender men reported experiencing a higher frequency of verbal abuse or harassment, problems obtaining a job, difficulties receiving health, medical, and HIV-prevention services, denial or loss of housing, and arrest (Table 2).

### Substance Use Rates Among Total Sample

Table 1 describes the sample characteristics and displays differences in predictor and outcome variables. After controlling for covariates, no significant differences were found on excessive alcohol use between transgender women and men. However, there were significant differences between transgender women and men as to cannabis and illicit drug use.

### Multivariate Modeling of Excessive Alcohol Use

**Transgender women**—The first step (demographic characteristics) of the hierarchical logistic regression indicated that transgender women with a high school education level or less were more likely to engage in excessive alcohol use than were individuals who completed college. While controlling for demographic variables, results of step 2 (sexual orientation and gender incongruence) indicated that a one-unit increase in gender dysphoria was associated with a 15% odds ( $OR = 1.15$ ) increase of excessive alcohol consumption among transgender women. Lastly, results of step 3 (indicators of minority stress) suggested that minority stressors experienced by transgender women were not related to excessive drinking. The final model revealed that having completed a lower level of education (adjusted  $OR = 2.02$ ) and reporting gender dysphoria (adjusted  $OR = 1.14$ ) remained associated with excessive alcohol use among transgender women. This model fit the observed data adequately (Table 3).

**Transgender men**—In steps 1 (demographic characteristics) and 2 (sexual orientation and gender incongruence), no demographic or sexual identity variables significantly contributed to predicting excessive alcohol use among transgender men. Step 3 (indicators of gender minority stress) revealed that for every one-point increase on the mean score of the internalized stigma measure that was endorsed, there was a 35% increase in the likelihood of excessive drinking among transgender men (adjusted  $OR = .74$ ; inverse  $OR = 1.35$ ). The final model indicated an adequate fit with the data; however, it was not significant (Table 3).

### Multivariate Modeling of Cannabis Use

**Transgender women**—Step 1 (demographic characteristics) suggested that younger age and lower annual income were associated with increased odds of cannabis use among transgender women. Step 2 (sexual orientation and gender incongruence) significantly contributed to the model's fit (Table 4). Results indicated that a nonheterosexual orientation and living full-time in the affirmed gender were uniquely associated with cannabis use. Step 3 (indicators of minority stress) significantly increased the model's fit and indicated that, while controlling for demographics and sexual orientation and gender incongruence, a one-unit increase on the mean score of the internalized stigma measure was associated with 1.57-increased odds in cannabis use among transgender women. Moreover, in the final model, younger age (inverse adjusted  $OR = 1.03$ ), identifying as bisexual (adjusted  $OR = 1.95$ ) or pansexual (adjusted  $OR = 2.40$ ), and living full-time in the affirmed gender (inverse adjusted  $OR = 2.63$ ) were uniquely associated with cannabis use. The final model significantly predicted cannabis use and indicated that the model fit the data adequately (Table 4).

**Transgender men**—In step 1 (demographic characteristics), being of younger age and reporting being partnered were associated with cannabis use. In step 2 (sexual orientation and gender incongruence), transgender men who self-identified with a sexual orientation of pansexual or queer were significantly more likely than heterosexual-identified individuals to engage in cannabis use. In step 3 (indicators of gender minority stress), cannabis use was not significantly associated with experiencing gender minority stressors, however, younger age (inverse adjusted  $OR = 1.04$ ), being partnered (inverse adjusted  $OR = 1.64$ ), and having a pansexual or queer sexual orientation (adjusted  $OR = 2.61$ ) remained significantly associated with cannabis use among transgender men. The final model significantly predicted cannabis use and indicated that the model fit the data adequately (Table 4).

### Multivariate Modeling of Illicit Drug Use

**Transgender women**—Results of step 1 (demographic characteristics) indicated that younger age was associated with increased odds of using illicit drugs. Step 2 (sexual orientation and gender incongruence) indicated that individuals who self-identified as White, gay or lesbian, or pansexual or queer had increased odds of using illicit drugs when compared to non-White heterosexual-identified individuals. In step 3 (indicators of minority stress), gender minority stressors were not significant predictors of illicit drug use; however, younger age (inverse adjusted  $OR = 1.05$ ) and self-identifying as White (inverse adjusted  $OR = 2.17$ ) remained significantly associated with using illicit drugs in the past three months. The final model was significant (Table 5).

**Transgender men**—In step 1 (demographic characteristics), sociodemographic variables did not uniquely predict illicit drug use. Results of adding step 2 (sexual orientation and gender incongruence) indicated that transgender men with a nonheterosexual self-identification had significantly increased odds (adjusted  $OR = 4.65$ ) of illicit drug use. The predictive significance of individual variables carried over into step 3. In this final model (adding gender minority stressors) among transgender men, reporting a nonheterosexual orientation was associated with increased odds (adjusted  $OR = 4.39$ ) of illicit drug use; specifically, reporting a gay or lesbian (adjusted  $OR = 4.74$ ), bisexual (adjusted  $OR = 4.34$ ),



or pansexual or queer (adjusted  $OR = 4.09$ ) sexual orientation was associated with an increased likelihood of using illicit drugs within the past three months. No other individual variables were independently predictive of illicit drug use among transgender men. The final model was not significant (Table 5).

## Discussion

Our findings suggest significant differences among transgender women and men on demographic characteristics, sexual orientation and gender incongruence, and gender minority stressors. We also identified substance use differences among transgender women and men, with transgender men reporting significantly higher frequency of cannabis and illicit drug use. In respect to our expected findings, our results partially supported our hypotheses around minority characteristics and gender minority stress and their associations to substance use.

Our first hypothesis, that anticipated minority characteristics (e.g., a nonheterosexual orientation, gender expression incongruence, and gender dysphoria) to be associated with increased substance use, was partially supported. Sexual orientation and gender incongruence (gender dysphoria and time spent living in the affirmed gender) contributed to predicting excessive alcohol and illicit drug use among transgender women and cannabis use among both transgender women and men, above and beyond the influence of gender minority stress. While controlling for demographic characteristics and sexual orientation and gender incongruence, gender minority stressors were more consistent predictors of substance use for transgender women than transgender men.

Our second hypothesis, that proposed gender minority stress would account for the associations between minority characteristics and substance use, received partial support. In evaluating specific minority stressors, internalized stigma was associated with cannabis use among transgender women and excessive alcohol use among transgender men. Other minority stress indicators did not consistently predict substance use among transgender individuals while controlling for demographic characteristics and components of sexuality and gender.

Except for excessive alcohol use, which revealed no significant differences, transgender women reported markedly lower rates of cannabis and illicit drug use than transgender men. Regarding perceived experiences of minority stressors, results indicated that, when controlling for demographic and sexual identity variables, transgender men reported higher levels of minority stress and accordingly more frequent cannabis and illicit drug use. However, individual minority stressors were not consistently associated with substance use.

## Theoretical and Clinical Implications

Altogether, our findings suggest that minority stress as a whole was more predictive of substance use than were *individual* minority stressors, particularly for transgender woman than men, even though transgender men endorsed higher levels of minority stress. Our findings extend research by Hendricks and Tesla (2012) and support the idea that unique psychological factors related to the experiences of transgender people may need to be

recognized in transgender-related minority stress, as well as their influence on risk behaviors. In addition, our findings suggest that minority stress theory may benefit from the integration of gender affirmation models (see Sevelius, 2013) to further promote the role that identity congruence has on risk behaviors and poor health outcomes.

The findings revealed that altogether, approximately 40% of transgender people in our sample reported endorsing either excessive alcohol, cannabis, or illicit drug use at some point during the three months prior to participating in the study. The rate from our study is significantly higher compared to the 26% reported by Klein and Golub; this discrepancy is likely to be explained by their focus on examining substance use in the context of using substances solely for coping with maltreatment related to gender identity or expression (Klein & Golub, 2016). In respect to risk factors and prevention efforts, our findings provide preliminary evidence of sexual orientation and gender-specific risk, particularly in regards to both individuals with a nontraditional sexual orientation identity and transgender men.

Research among the general population of individuals who use substances suggests that there is a 72% cumulative lifetime probability of seeking treatment for substance use disorders (Kessler et al., 2001). Currently, there are no available data on the rates of transgender people in the U.S. seeking treatment for substance use disorders. Although we focused on substance use (rather than misuse, abuse, maladaptive use, dependence, or substance use disorders), Kessler's estimate suggests that transgender people who use substances may be likely to seek treatment in their lifetime. The *Standards of Care for the Health of Transsexual, Transgender, and Gender Nonconforming People* (Coleman et al., 2012; Fraser, 2009) encourages the prevention, treatment, and appropriate management of substance use disorders among transgender people in order to facilitate the gender exploration process. While a majority of general mental healthcare providers report a high knowledge about and acceptance of transgender people (Willoughby et al., 2010), there is evidence that suggests 86% of substance abuse counselors have not received any training regarding transgender issues and hold negative attitudes toward transgender individuals (Eliason, 2001). Given the potential for transgender people who use substances to pursue treatment, it will be important to provide training regarding transgender issues to healthcare providers focused on treating substance use disorders.

### Study Limitations

One limitation of our study is its constraints in using archival data. The original study's internet-based sampling method was nonprobabilistic. Therefore, our study's generalizability is limited and results may not represent transgender people throughout the U.S. However, investigators have examined the effect of internet- versus noninternet-based survey research (e.g., in person, paper-and-pencil, phone based sampling) in the U.S. on disclosure rates with respect to sexuality (Hines, Douglas, & Mahmood, 2010; Meyerson & Tryon, 2003), trauma (Read, Farrow, Jaanimagi, & Ouimette, 2008), and substance use (Miller & S nderlund, 2010; Parks, Pardi, & Bradizza, 2006). Findings have suggested that both internet-and noninternet-based survey research are likely to yield similar responses with respect to quality and rates of disclosure (Germine et al., 2012; Gosling, Vazire,

Srivastava, & John, 2004; McMorris et al., 2009). This holds particularly true when the aim is to generalize findings to hard-to-reach populations, such as transgender individuals.

Another limitation of our study is its utilization of self-reported data, which may lead to social desirability or impression management; providing responses without fully understanding questions; or providing responses to questions despite limited introspection on thoughts, feelings, or behaviors. In addition, because our study is one of the first to examine the relationship between minority stressors and substance use among transgender people, standardized measures of the specific components of minority stress theory were not utilized. Hughto, Reisner, and Pachankis (2015) suggest multiple levels to gender minority stress that include stigma at the structural level, interpersonal level, and individual level, which may not have been captured through our standardized measures.

Accordingly, this prevents direct comparison of minority stressors across studies that test minority stress theory. Lastly, our study did not consider the possible impact of cross-sex hormones on substance use propensity. Among cisgender women and men, neuroendocrine mechanisms have been hypothesized to moderate the propensity for substance use (Becker & Hu, 2008). Therefore, the impact of cross-sex hormone therapy on substance use among transgender people is unknown and should be considered a potential modifying factor. Future studies may consider controlling for cross-sex hormones.

### Future Research

Based on our study's findings, there are many opportunities for future research about substance use among transgender individuals and its association with gender and sexual orientation characteristics and minority stress. For instance, the gender pattern of substance use we discovered suggests that transgender men have generally higher levels of substance use than transgender women. This dichotomy reflects a similar pattern found in substance use among cisgender men and women (Brady & Randall, 1999; Goldstein et al., 2012; Nolen-Hoeksema, 2004), suggesting that gender socialization and expectations may play a role in determining substance use behaviors among transgender people. Based on Sevelius's (2013) gender affirmation theory, transgender individuals may engage in substance use behaviors in order to validate and affirm their gender identities. We therefore recommend that future research examine significant differences between substance use among transgender men and women, as it could have broader implications for prevention efforts based on gender identity as opposed to sex. However, in reviewing the literature we recognized that there is a lack of epidemiological surveillance and research on the topic of substance use among transgender people (Reisner, Poteat, Keatley, Cabral, Mothopeng, et al., 2016).

In addition to the association between gender characteristics and substance use among transgender people, sexual orientation characteristics should be investigated. Previous research on LGB populations has suggested that subcultural norms and perceived drug availability indirectly influence and subsequently increase the risk of substance use among sexual minority groups (Grella, Greenwell, Mays, & Cochran, 2009). However, it is unknown whether these findings generalize to transgender people, and therefore should be explored. Based on our study, there is a need for future research to evaluate risk mechanisms

among nonheterosexual transgender individuals whose sexual identities differ from stereotypical gender definitions (e.g., pansexual or queer). For instance, both transgender women and men study participants who self-identified their sexual orientations as pansexual or queer were associated with increased cannabis use. Similarly, transgender men participants whose sexual orientation was self-identified as pansexual or queer were associated with increased illicit substance use. Future studies should consider these findings to help inform an investigation of the relationship between nontraditional sexual orientation identities among transgender individuals and substance use.

Finally, although our study revealed that components of sexuality and gender are more significantly associated with substance use than minority stressors among transgender people, substance use should still be investigated in the context of its utility as a coping strategy for transgender people attempting to manage minority stress. There is some recent evidence that suggests gender and sexual minorities more frequently employ avoidance as a coping mechanism (Budge, Adelson, & Howard, 2013; Klein & Golub, 2016; Talley, Sher, & Littlefield, 2010; Weber, 2008). Since substance use can be conceptualized as a possible mechanism for coping through avoidance, the management of gender and sexual minority stress with substances should be further studied.

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Sample Characteristics

Table 1

Variable	Total sample (N = 1,210)			Transgender women (n = 680)			Transgender men (n = 530)			p-value
	Mdn	M	SD	Mdn	M	SD	Mdn	M	SD	
<b>Demographics</b>										
Age (years)	29.00	32.6	11.89	37.00	32.63	12.29	24.00	26.14	7.42	
Annual household income (U.S. dollars)	35,000	45,642	44,113	40,000	52,686	48,288	27,000	36,568	36,140	<.001
		% (n)			% (n)			% (n)		
Racial/ethnic minority status										= .28
White (non-Latino/a)		78.3 (948)			79.6 (541)			76.8 (407)		
NonWhite		21.7 (262)			20.4 (139)			23.2 (123)		
Highest level of education completed										= .01
High school or less		13.4 (162)			13.4 (91)			13.4 (71)		
Some college		48.7 (589)			45.1 (307)			53.2 (282)		
College/university		37.9 (459)			41.5 (282)			33.4 (177)		
Relationship status										<.001
Single		44 (532)			47.9 (326)			38.9 (206)		
In a romantic relationship		56 (678)			52.1 (354)			61.1 (324)		
<b>Components of gender and sexuality<sup>†</sup></b>										
Self-reported sexual orientation										<.001
Gay/lesbian		22.6 (272)			21.7 (147)			23.7 (125)		
Bisexual		28.3 (341)			35.9 (243)			18.6 (98)		
Pansexual/queer		23.0 (277)			12.1 (82)			36.9 (195)		
Heterosexual/straight		26.1 (315)			30.3 (205)			20.8 (110)		
Affirmed gender expression										<.001
Part-time		68.1 (820)			70.6 (478)			64.9 (342)		
Full-time		31.9 (384)			29.4 (199)			35.1 (185)		
Gender dysphoria										= .01
No		30.3 (366)			33.1 (225)			26.7 (141)		
Yes		68.7 (840)			66.5 (452)			73.2 (388)		

Variable	Total sample (N = 1,210)			Transgender women (n = 680)			Transgender men (n = 530)			p-value
	Mdn	M	SD	Mdn	M	SD	Mdn	M	SD	
<b>Minority stressors<sup>‡</sup></b>		<i>M (SE)</i>			<i>M (SE)</i>			<i>M (SE)</i>		
Enacted stigma		2.19 (.06)			1.98 (.08)			2.47 (.09)		< .001
Internalized stigma		4.55 (.28)			4.42 (.04)			4.72 (.04)		< .001
Felt stigma		4.59 (.28)			4.53 (.04)			4.66 (.04)		= .02
<b>Substance used in the past 3 months<sup>‡</sup></b>		<i>% (n)</i>			<i>% (n)</i>			<i>% (n)</i>		
Excessive drinking		21.5 (233)			22.3 (137)			20.5 (96)		= .13
Cannabis		24.4 (265)			19.0 (117)			31.3 (148)		< .001
Illicit drugs (non-cannabis/non-prescription)		11.6 (126)			10.6 (65)			12.9 (61)		< .001
No at-risk drinking or illicit (including marijuana) drug(s)		59.6 (644)			62.5 (384)			55.7 (260)		< .001

Note.

<sup>‡</sup>Controlling for gender and statistically significant different demographic variables between transgender women and men.

**Table 2**

Frequency count and percentage of endorsed enacted stigma event.

<b>Enacted stigma event</b>	<b>Transgender women n (%)</b>	<b>Transgender men n (%)</b>	<b><math>\chi^2</math></b>
Verbal abuse/harassment	415 (64.4)	396 (78.6)	26.55***
Problems obtaining a job	195 (30.4)	244 (48.6)	38.83***
Physical abuse/harassment	150 (23.3)	126 (25.0)	0.39
Loss of job	150 (23.3)	122 (24.3)	0.10
Problems getting health/medical services	124 (19.3)	160 (31.7)	23.03***
Sexual abuse/harassment	101 (15.7)	72 (14.3)	.33
Denial/loss of housing	65 (10.1)	73 (14.5)	4.82*
Arrest	41 (6.4)	16 (3.2)	5.45*
Problems receiving HIV prevention services	14 (2.2)	27 (5.4)	7.47**
Problems getting alcohol/drug services	8 (1.2)	7 (1.4)	0.00

Note. Enacted stigma event was counted if participant endorsed one or more experiences of stigma as a result of their transgender identity or gender presentation;  $\chi^2 =$  Yates' chi-squared test;

\*\*\*  
 $p < .001$ ;

\*\*  
 $p < .01$ ;

\*  
 $p < .05$ .

**Table 3**

Summary of hierarchical logistic regression for predictors of excessive drinking in the past 3 months among transgender women and men.

Variable	Step 1			Step 2			Step 3					
	OR	95% CI	OR	95% CI	AOR	95% CI	AOR	95% CI	AOR	95% CI		
Step 1: Demographics												
Age (years)	.99	[.97, 1.01]	.99	[.92, 1.02]	.99	[.98, 1.01]	.98	[.95, 1.02]	.99	[.97, 1.01]	.99	[.95, 1.02]
NonWhite (vs. White)	.78	[.47, 1.29]	.96	[.54, 1.67]	.73	[.43, 1.24]	.98	[.56, 1.74]	.70	[.41, 1.19]	1.07	[.60, 1.91]
Income (US dollars)	1.00	[1.00, 1.01]	1.00	[.99, 1.01]	1.00	[1.00, 1.01]	1.00	[1.00, 1.01]	1.00	[1.00, 1.01]	1.00	[1.00, 1.01]
Completed education												
High school or less (vs. college/university)	2.01*	[1.10, 3.68]	1.40	[.65, 3.03]	2.05*	[1.01, 3.82]	1.37	[.63, 3.00]	2.02*	[1.08, 3.77]	1.24	[.56, 2.77]
Some college (vs. college/university)	1.15	[.74, 1.79]	1.267	[.74, 2.17]	1.23	[.77, 1.94]	1.22	[.71, 2.11]	1.27	[.80, 2.02]	1.12	[.64, 1.94]
Single (vs. partnered)	1.12	[.75, 1.67]	.92	[.57, 1.49]	1.26	[.83, 1.91]	.94	[.58, 1.53]	1.27	[.84, 1.93]	.90	[.55, 1.48]
Step 2: Components of gender and sexuality												
Sexual orientation												
Gay/lesbian (vs. heterosexual/straight)					1.25	[.73, 2.16]	1.46	[.70, 3.02]	1.11	[.63, 1.95]	1.85	[.87, 3.97]
Bisexual (vs. heterosexual/straight)					.72	[.43, 1.20]	.72	[.32, 1.63]	.66	[.39, 1.11]	.91	[.39, 2.12]
Pansexual/queer (vs. heterosexual/straight)					.98	[.50, 1.93]	1.00	[.51, 1.96]	.78	[.38, 1.59]	1.43	[.68, 3.02]
Gender dysphoria					1.15**	[1.04, 1.27]	1.01	[.87, 1.18]	1.14*	[1.02, 1.27]	1.03	[.88, 1.21]
Affirmed gender expression: part-time (vs. full-time)												
Step 3: Minority stressors					1.62	[.96, 2.72]	.83	[.48, 1.43]	1.72	[.97, 3.02]	.88	[.50, 1.55]
Enacted stigma									1.06	[.93, 1.20]	.87	[.74, 1.09]
Internalized stigma									1.18	[.93, 1.54]	.74*	[.56, .97]
Social stigma									1.20	[.92, 1.54]	.98	[.73, 1.31]
Model summary statistics												
Model $\chi^2$	9.12, $p = .17$		2.91, $p = .82$		31.48***		6.75, $p = .82$		36.55***		16.00, $p = .31$	
-2 Log Likelihood	628.64		454.77		606.27		450.93		601.2		441.67	
Nagelkerke $R^2$	.02		.01		.08		.02		.09		.06	

Note. AOR = Adjusted Odds Ratio;

\*\*\*  
 $p < .001$ ;

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\*  
\*  
 $p < .01$ ;  
 $p < .05$ .

Transgender women  $n = 596$ ; transgender men  $n = 454$ .

Hosmer-Lemeshow test of fit of final models: transgender women,  $\chi^2 = 5.63, p = .69$ ; transgender men,  $\chi^2 = 9.59, p = .30$ .



**Table 4**

Summary of hierarchical logistic regression for predictors of cannabis use in the past 3 months among transgender women and men.

Variable	Step 1			Step 2			Step 3					
	OR	95% CI	Transgender women	OR	95% CI	Transgender men	AOR	95% CI	Transgender women	AOR	95% CI	Transgender men
Step 1: Demographics												
Age (years)	.98**	[.96, .99]	.95**	[.92, .98]	.98*	[.95, 1.00]	.96*	[.93, 1.00]	.97**	[.96, .99]	.96*	[.93, 1.00]
NonWhite (vs. White)	.80	[.47, 1.37]	.89	[.54, 1.45]	.70	[.40, 1.21]	.82	[.50, 1.37]	.65	[.37, 1.14]	.83	[.50, 1.38]
Income (US dollars)	1.00*	[.99, 1.00]	1.00	[.99, 1.01]	1.00	[.99, 1.00]	1.00	[1.00, 1.01]	1.00	[.99, 1.00]	1.00	[1.00, 1.01]
Completed education												
High school or less (vs. college/university)	1.56	[.82, 2.99]	.84	[.43, 1.66]	1.95*	[1.00, 3.80]	.94	[.57, 1.88]	1.95	[.99, 3.86]	.89	[.44, 1.80]
Some college (vs. college/university)	1.19	[.73, 1.92]	.85	[.54, 1.35]	1.22	[.75, 2.01]	.92	[.57, 1.47]	1.32	[.80, 2.17]	.89	[.56, 1.44]
Single (vs. partnered)	1.08	[.70, 1.65]	.62*	[.41, .95]	1.01	[.65, 1.56]	.62*	[.41, .96]	1.06	[.68, 1.65]	.61*	[.40, .95]
Step 2: Components of gender and sexuality												
Sexual orientation												
Gay/Lesbian (vs. heterosexual/straight)					1.94*	[1.00, 3.77]	1.31	[.64, 2.69]	1.56	[.78, 3.09]	1.40	[.67, 2.92]
Bisexual (vs. heterosexual/straight)					2.22**	[1.24, 4.00]	1.61	[.79, 3.31]	1.95*	[1.07, 3.56]	1.70	[.82, 3.56]
Pansexual/queer (vs. heterosexual/straight)					3.43***	[1.66, 7.10]	2.39**	[1.28, 4.46]	2.40*	[1.11, 5.20]	2.61**	[1.32, 5.14]
Gender dysphoria					1.08	[.96, 1.21]	.99	[.86, 1.13]	1.03	[.90, 1.16]	1.00	[.87, 1.16]
Affirmed gender expression: part-time (vs. full-time)					.38***	[.23, .63]	1.07	[.66, 1.74]	.38***	[.22, .66]	1.09	[.66, 1.78]
Step 3: Minority stressors												
Enacted stigma									1.05	[.93, 1.18]	.99	[.87, 1.21]
Internalized stigma									1.57***	[1.21, 2.03]	.87	[.67, 1.12]
Social stigma									1.19	[.91, 1.55]	1.05	[.82, 1.34]
Model summary statistics												
Model $\chi^2$	23.56***		15.18*		48.23***		25.64**		61.98***		27.16*	
-2 Log Likelihood	558.22		554.29		533.55		543.83		519.79		542.31	
Nagelkerke $R^2$	.06		.05		.13		.08		.16		.08	

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Note. AOR = Adjusted Odds Ratio;

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 $p < .001$ ;

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 $p < .01$ ;

\*  
 $p < .05$ .

Transgender women  $n = 596$ ; transgender men  $n = 459$ .

Hosmer-Lemeshow test of fit of final models: transgender women,  $\chi^2 = (df=8) = 7.01, p = .54$ ; transgender men,  $\chi^2 = (df=8) = 9.16, p = .33$ .

**Table 5**

Summary of hierarchical logistic regression for predictors of illicit drug (noncannabis/nonprescription) use in the past 3 months among transgender women and men.

Variable	Step 1				Step 2				Step 3			
	Transgender women		Transgender men		Transgender women		Transgender men		Transgender women		Transgender men	
	OR	95% CI	OR	95% CI	AOR	95% CI	AOR	95% CI	AOR	95% CI	AOR	95% CI
Step 1: Demographics												
Age (years)	.95***	[.93, .98]	.98	[.93, 1.02]	.95***	[.93, .98]	.99	[.94, 1.03]	.95***	[.93, .98]	.98	[.93, 1.03]
NonWhite (vs. White)	.59	[.29, 1.20]	.78	[.39, 1.56]	.48*	[.23, 1.00]	.77	[.37, 1.47]	.46*	[.22, .95]	.70	[.35, 1.50]
Income (US dollars)	1.00	[.99, 1.00]	1.00	[1.00, 1.01]	1.00	[.99, 1.00]	1.00	[1.00, 1.01]	1.00	[.99, 1.00]	1.00	[1.00, 1.01]
Completed education												
High school or less (vs. college/university)	.90	[.39, 2.11]	1.33	[.53, 3.32]	1.09	[.46, 2.60]	1.52	[.61, 4.04]	1.07	[.45, 2.58]	1.54	[.59, 4.03]
Some college (vs. college/university)	.91	[.49, 1.67]	1.24	[.65, 2.36]	.94	[.50, 1.76]	1.40	[.73, 2.73]	.99	[.52, 1.86]	1.45	[.74, 2.84]
Single (vs. partnered)	1.47	[.85, 2.54]	.79	[.44, 1.41]	1.51	[.86, 2.65]	.78	[.43, 1.40]	1.56	[.89, 2.74]	.79	[.43, 1.42]
Step 2: Components of gender and sexuality												
Sexual orientation												
Gay/Lesbian (vs. heterosexual/straight)					2.11*	[1.03, 4.46]	4.88**	[1.56, 16.68]	1.82	[.84, 3.94]	4.74**	[1.42, 15.83]
Bisexual (vs. heterosexual/straight)					.75	[.34, 1.64]	4.58*	[1.43, 15.79]	.66	[.30, 1.48]	4.34*	[1.28, 14.65]
Pansexual/queer (vs. heterosexual/straight)					2.57*	[1.12, 5.93]	4.50**	[1.55, 14.65]	1.85	[.76, 4.55]	4.09*	[1.26, 13.31]
Gender dysphoria					1.12	[.97, 1.29]	.86	[.70, 1.05]	1.11	[.95, 1.29]	.88	[.71, 1.07]
Affirmed gender expression: part-time (vs. full-time)					.61	[.35, 1.32]	1.03	[.53, 1.99]	.69	[.34, 1.40]	1.02	[.52, 1.99]
Step 3: Minority stressors												
Enacted stigma									1.10	[.94, 1.27]	1.14	[.97, 1.33]
Internalized stigma									1.21	[.88, 1.65]	1.00	[.70, 1.42]
Social stigma									1.20	[.84, 1.70]	1.04	[.74, 1.46]
Model summary statistics												
Model $\chi^2$	25.28***		3.69, $p = .72$		41.48***		16.01, $p = .14$		46.41***		18.08, $p = .20$	
-2 Log Likelihood	385.65		348.19		369.45		335.07		364.52		332.63	
Nagelkerke $R^2$	.08		.02		.14		.06		.15		.08	

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Note. *AOR* = Adjusted Odds Ratio;

\*\*\*  
 $p < .001$ ;

\*\*  
 $p < .01$ ;

\*  
 $p < .05$ .

Transgender women  $n = 598$ ; transgender men  $n = 445$ .

Hosmer-Lemeshow test of fit of final models: transgender women,  $\chi^2 = (df = 8) = 7.60, p = .47$ ; transgender men,  $\chi^2 = (df = 8) = 8.50, p = .39$ .