Published in final edited form as:
Ethn Inequal Health Soc Care. ; 6(4): 121–136. doi:10.1108/EIHSC-08-2013-0013.

Transgender women of color: discrimination and depression symptoms

Kevin Jefferson,
Rollins School of Public Health, Emory Universty, Atlanta, Georgia, USA

Torsten B. Neilands [Professor], and
Center for AIDS Prevention Studies, University of California, San Francisco, California, USA

Jae Sevelius [Assistant Professor]
Center for AIDS Prevention Studies, University of California, San Francisco, California, USA

Abstract

Purpose—Trans women of color contend with multiple marginalizations; the purpose of this study is to examine associations between experiencing discriminatory (racist/transphobic) events and depression symptoms. It uses a categorical measure of combined discrimination, and examines a protective association of transgender identity on depression symptoms.

Design/methodology/approach—Data from a subset of trans women of color participants in the Sheroes study were analyzed with linear and logistic regression. Associations of depression symptoms with racist and transphobic events, combined discrimination, coping self-efficacy, and transgender identity were assessed with odds ratios.

Findings—Exposure to discriminatory events and combined discrimination positively associated with depression symptom odds. Increased transgender identity associated with increased coping self-efficacy, which negatively associated with depression symptom odds.

Research limitations/implications—Cross-sectional study data prohibits inferring causality; results support conducting longitudinal research on discrimination's health effects, and research on transgender identity. Results also support operationalizing intersectionality in health research. The study's categorical approach to combined discrimination may be replicable in studies with hard to reach populations and small sample sizes.

Practical implications—Health programs could pursue psychosocial interventions and anti-discrimination campaigns. Interventions might advocate increasing participants' coping self-efficacy while providing space to explore and develop social identity.

Social implications—There is a need for policy and health programs to center trans women of color concerns.

Originality/value—This study examines combined discrimination and identity in relation to depression symptoms among trans women of color, an underserved population.

Paper type—Research paper

corresponding author and can be contacted at: kevin.a.jefferson@emory.edu.

Keywords

Discrimination; Health; Depression; Transgender; Race

Introduction

Transgender people are individuals who do not identify with the gender that society commonly associates with their birth sex assignment (L. Graham 2012, e-mail, October 29; Serano, 2007). Transgender women, or male-to-female (MTF) trans persons are assigned a male sex, however, they do not identify as men. Trans women identify and often live as a feminine gender (i.e. as women or transgender women) (Serano, 2007). In contrast, cisgender or cisexual people identify and live as the gender thought to correspond with their birth sex assignment. Cisgender women are assigned a female sex and they identify as women.

Discrimination against trans persons has been reported to be pervasive in society, including in housing, healthcare, employment, and education (Grant *et al.*, 2011). Many trans people encounter barriers to accessing gender appropriate government issued identification (Grant *et al.*, 2011). Trans people also experience high rates of physical as well as sexual violence (Lombardi *et al.*, 2002; Stotzer, 2009). This systematic discrimination is a product of transphobia, an irrational fear or hatred of trans people, as well as cisnormativity (Bauer *et al.*, 2009). Cisnormativity “describes the expectation that all people are cissexual” and denies the existence of trans people in cultural knowledge and institutional infrastructure (Bauer *et al.*, 2009, p. 356). Wilchins and Taylor (as cited in Stotzer, 2009) and others suggest that race and gender presentation influence trans people’s experiences of discrimination (Grant *et al.*, 2011; Meyer, 2008; Stotzer, 2009). Trans women of color for instance are killed in epidemic numbers (Balzer *et al.*, 2012; National Coalition of Anti-Violence Programs, 2013).

Although crucial efforts from advocacy and grassroots groups exist to address discrimination against trans women of color, to date scant research has addressed the specific needs or experiences of trans women of color. Trans women of color live within intersections of discrimination based on race, being women, and being transgender (Crenshaw, 1991; Meyer, 2008). Current conceptions of transphobia, however, are largely based on the experiences of white trans people, whereas predominate conceptions of sexism privilege the experiences of white cisgendered women, and popular conceptions of racism center on the experiences of cisgendered men of color (Crenshaw, 1991, 2013). Utilizing Crenshaw’s (1991) theory of intersectionality, this study posited that the experience of discrimination based on race, being female, and being transgender is beyond additive. While trans women of color share experiences of transphobia and cisnormativity with other transgender people, experiences of sexism with other women, and experiences of racism with other people of color, these experiences interact and cannot be separated: trans women of color experience discrimination uniquely as trans women of color.

Previous literature has documented a link between experiencing discrimination (such as racism or homophobia) and psychological distress, including depression symptoms (Díaz *et*

al., 2004; Graham *et al.*, 2011b; Landrine and Klonoff, 1996; Nuttbrock *et al.*, 2010). This is consistent with a minority stress hypothesis, which describes the physical and psychological health effects of stress experienced due to stigma and discrimination, or conflict between minority and dominant society values (Meyer, 1995). Using a stress and coping framework, minority stress can be explained to work along other life stressors to create disequilibrium within one's regular functioning (Lazarus and Cohen, 1977; Meyer, 2003). While stressors need not be specific to one's minority status to affect individuals, minority stress presents an additional and chronic stress exposure which taxes the body's available physical and psychological resources to maintain its equilibrium (Meyer, 2003; Miller and Kaiser, 2001). Bodies are affected by disequilibrium through physical and mental health symptoms, including depression (Taylor and Stanton, 2007). High rates of depression and depressive symptomology have been reported among trans people, including trans people of color (Clements-Nolle *et al.*, 2001; Nemoto *et al.*, 2004, 2011; Rotondi *et al.*, 2011a, b). While only a handful of studies have examined transphobia in relation to depression symptoms, these studies have a found a positive relationship between transphobia and depression symptoms (Nemoto *et al.*, 2004, 2011; Rotondi *et al.*, 2011a, b).

Coping refers to action individuals take to gain equilibrium after experiencing stress (Folkman and Moskowitz, 2004). Coping efforts can promote resilience if they facilitate a neutral or positive health outcome in the presence of a stressor, such as minority stress, that is a health risk (Fergus and Zimmerman, 2005). Trans women of color learning to recognize and not internalize stigmatizing beliefs could relate to coping efforts that enable their resilience (Hendricks and Testa, 2012; Meyer, 2003). This resilience may be facilitated by resources that are accessed through possessing transgender and racial social identities (DiFulvio, 2011; Hendricks and Testa, 2012; Herek and Garnets, 2007; Meyer, 2003)[1]. Qualitative research suggests that recognizing and navigating discrimination develops in concert with a transgender social identity, and may help trans people to not internalize stigma (A. Singh, 2013, e-mail, 29 May; Singh and McKleroy, 2010; Singh *et al.*, 2011). Possessing transgender and racial social identities could specifically allow trans women of color to identify and compare themselves with other trans women of color, rather than with cisgender women of color or white women. This could empower trans women of color to recognize experiences of discrimination and to not internalize stigma. In turn this might facilitate positive regard of one's minority identity. Possessing a positive view of one's minority identity could facilitate self-validation and decrease depression (Crocker *et al.*, 1994; Meyer, 2003; Zea *et al.*, 1999).

This study examined transgender identity among trans women of color, coping self-efficacy, discrimination, and the likelihood of depression symptoms. Self-efficacy refers to one's belief in their ability to perform a specific action; social cognitive theory posits it is antecedent to performing that action (Bandura, 1989). According to social cognitive theory, coping self-efficacy, or confidence in one's ability to cope, would predict one's ability to

[1]Social identity refers to "that part of an individual's self-concept which derives from his [or her] knowledge of his [or her] membership of a social group (or groups) together with the emotional significance attached to that membership" (Tajfel, 1974, p. 69). A transgender social identity can be experienced distinct from a transgender gender identity; someone with a trans experience may not identify their gender as transgender, but may have affiliation and identification with being transgender socially, or with other trans people as a social group category.

cope with stress (Chesney *et al.*, 2006). This study hypothesized that experiences of discrimination (racist and transphobic events) would associate with increased odds of depression symptoms, and that higher levels on a transgender identity measure would associate with higher levels of coping self-efficacy, which in turn would associate with decreased odds of depression symptoms. The study first examined a relationship between, respectively, experiencing racist and transphobic events and depression symptoms. It then examined how the transgender identity measure and coping self-efficacy relate before looking at transgender identity and experiences of transphobic events in a combined model. Finally the study created a combined racism and transphobia measure as a proxy for intersectionality of discrimination. The study examined a relationship between this combined measure and depression symptoms, in line with its hypothesis that experiences of discrimination would associate with increased odds of depression symptoms (see Figures 1–3 for conceptual models).

Method

The sample

Sheroes is an ongoing study and pilot intervention based in the San Francisco Bay Area that assesses a variety of health-related domains and behaviors among transgender women. This paper utilizes a subset of pre-intervention Sheroes data collected between June 2011 and June 2012. As of June 14, 2012, this included data from 109 people. Those eligible to participate are trans women 18 years of age or older, who are able to provide informed consent and speak English. Sheroes uses a combination of interviewer-administration and handheld assisted personal interviewing (HAPI). HAPI, like audio computer assisted self-interviewing, can increase the likelihood that participants will report sensitive behaviors because the behaviors are recorded confidentially. This paper examines data from 98 eligible respondents who reported non-white or multiple racial backgrounds as of June 14, 2012. Racial backgrounds reported by these participants included African-American (n = 69), Latina (n = 25), Pacific Islander (n = 5), Asian (n = 8), Native American (n = 7), white (n = 13), and Multi-racial (n = 22). The majority reported monthly incomes below $2,001 ($n$ = 89), finishing high school (n = 72), and a transgender female gender identity (n = 87). Fourteen participants reported their gender identity as female, rather than as transgender female. Participant ages ranged from 23 to 66 with a median of 45 (mean = 42.84, SD = 9.82). Table I displays demographics and descriptive measures of the sample.

Measures used

Demographic measures—Data were collected on participant race, gender identity, birth year, highest level of education attained, and income category. Birth year was used to estimate participants' age at the time of the survey. Participants were allowed to select multiple categories for racial background and gender identity. Participants reporting more than one racial background were coded as multi-racial for analysis; race was then coded as African-American (n = 54) or other person of color (n = 44) in study analyses. Gender was not included in analyses as the majority of participants (n = 87) identified their gender as transgender female.

Experiences of racism—A scale was adapted from Landrine and Klonoff's (1996) Schedule of Racist Events to access racism experienced over participants' lifetimes. The adapted scale consisted of 13 items and scores could range from 13 to 78. Ninety three participants completed the scale and Chronbach's α was 0.94.

Experiences of transphobia—A 13-item transphobic events measure was created to evaluate lifetime experiences of transphobia. Exploratory factor analysis (EFA) was conducted with principal axis factor extraction and promax rotation (Hatcher, 1994; SAS Institute, 2011). Three factors were extracted; however, only one was retained per examination of the scree plot, eigenvalues, and interpretability of rotated factor loadings. Chronbach's α was 0.92. Scores were obtained by summation of the Likert scale question responses. The possible range of scores was 13–78. Ninety five participants completed the scale.

Transgender identity—A transgender identity scale was patterned after Phinney's (1992) Multi Ethnic Identity Measure (MEIM). The MEIM is designed to reflect a process of identity formation (Phinney, 1992). It examines positive attitudes toward one's ethnic group as well as an understanding of the role ethnic membership has in one's life (Phinney, 1992). For these reasons, the MEIM provided a basis for exploring positive attitudes about being transgender and participant understandings about what role being transgender has in their lives. Hereafter these concepts are referred to as transgender identity. This study assumes that the transgender identity scale primarily references a transgender social group identity rather than a transgender gender identity. Participants identifying their gender as female, as well as those identifying their gender as transgender female, could posses a transgender social group identity; participants who do not identify their gender as transgender would not possess a transgender gender identity. Item responses were collected on a one to five Likert scale. EFA was done with 92 participants using principal axis factor extraction and promax rotation (Hatcher, 1994; SAS Institute, 2011). Three factors were extracted, however, examination of the scree plot and eigenvalues along with rotated factor loadings indicated that a single factor solution may be preferable. Consequently, regularized exploratory factor analysis, was run using MATLAB codes written by Jung and Lee (2011) to further clarify the EFA results (Jung and Lee, 2011; The MathWorks Inc, 2012). The most poorly performing items were dropped resulting in a single-factor measure with seven items. The scale was scored by averaging across the seven items. Chronbach's α computed from 94 participants was 0.82.

Coping self-efficacy—Due to the difficulty of appraising coping efforts, Chesney *et al.* (2006) developed the Coping Self-efficacy Scale as a proxy for a more direct assessment of coping. The Coping Self-efficacy Scale assesses self-efficacy to respond to general stressors by obtaining social support, changing a situation, and changing how one thinks about a situation (Chesney *et al.*, 2006). Validity analysis of the Coping Self-efficacy Scale showed predictive validity over time in relation to psychological well-being, which suggests coping self-efficacy is an effective alternate evaluation to a more direct measurement of coping (Chesney *et al.*, 2006). Sheroes utilized a 15-item Coping Self-efficacy scale. Scores ranged between 0 and 150, and Chronbach's α, computed with data from 86 participants, was 0.94.

Combined discrimination—To access the combined effect of racism and transphobia, categorical variables were created from results of the experiences of racism and transphobia scales. Participants were coded as experiencing high racism or transphobia, respectively, if their cumulative score on the experiences of racism or transphobia scale was at, or above, 52. This score corresponded to an average item score of "a lot" or greater events of discrimination. Additionally, participants were coded as experiencing high racism or transphobia if they reported experiencing "a lot" or greater events of discrimination for critical scale questions. These results were compared and categorical variables were created to reflect experiencing low levels of both racism and transphobia (low combined discrimination, $n = 50$, reference group), a high level of one discrimination and a low level of the other (medium combined discrimination, $n = 22$), and high levels of both racism and transphobia (high combined discrimination, $n = 20$). Due to their limited number, participants coded as experiencing high levels of racism and low levels of transphobia ($n = 7$) were analyzed in the medium combined discrimination group with participants coded as experiencing low levels of racism and high levels of transphobia ($n = 15$).

Depression symptoms—A modified 11-item scale derived from the full Epidemiological Studies Depression (CES-D) symptoms index assessed depression symptoms (Kohout *et al.*, 1993; Radloff, 1977). Scores at or above 16 or 20 on the full CES-D can indicate depression symptoms (Kohout *et al.*, 1993). Because the average score among respondents was 19, depression symptoms were considered present for scores 20 or above. In all, 90 participants completed the Sheroes CES-D scale. Reliability for the scale, Chronbach's α, was 0.84.

Analysis

Analyses were performed with SAS version 9 software unless otherwise stated (SAS Institute, 2008, 2011). The following analyses phases were undertaken: first, descriptive statistics; second, correlations of demographic variables with depression symptoms; third, association between depression symptoms and exposures to racism and transphobia, respectively; fourth, association between depression symptoms, transgender identity, and coping self-efficacy; fifth, association between depression symptoms and transphobic events, with adjustment for transgender identity; sixth, association between depression symptoms and combined discrimination.

Descriptive statistics and correlations of demographic variables with depression symptoms—One-way and cross-tabular frequency tables and measures of central tendency (e.g. mean, median) and variability (e.g. standard deviation) were used to characterize the sample. Bivariate correlations were assessed using Pearson correlations.

Depression symptoms and exposures to racism and transphobia—Multivariable logistic regression models were fitted to the depression symptoms outcome with events of racism and transphobia as explanatory variables. Estimated age, income category, and race (African-American or other person of color) were included as covariates. Covariates and explanatory variables were removed from models via backward elimination until all remaining effects were significant at $p<0.05$. Due to the moderate sample size,

likelihood ratio (LR) tests were used to assess the statistical significance of explanatory variables in logistic regression models. Profile likelihood (PL) confidence intervals for odds ratios are also reported from logistic regression models.

Depression symptoms, transgender identity, and coping self-efficacy—Linear regression examined association between transgender identity and coping self-efficacy, whereas univariate and multivariable logistic regression examined associations between depression symptoms (outcome variable), transgender identity (explanatory variable) and coping self-efficacy (explanatory variable). An additional follow-up analysis was conducted with Andrew Hayes' (2012) PROCESS macro to assess coping self-efficacy as a mediator of the association between transgender identity and depression symptoms. For indirect effects estimated in mediation analyses, asymmetric 95 percent confidence intervals were estimated via 5,000 bootstrap resamples. An interaction term was created to assess moderation between the associations of coping self-efficacy and transgender identity with depression symptoms.

Depression symptoms and transphobic events, with adjustment—Multivariable logistic regression examined an association of depression symptoms and transphobic events with adjustment for transgender identity; coping self-efficacy was entered into this model as a mediator variable. Interaction terms between transphobic events and transgender identity, and transphobic events and coping self-efficacy, were created and also entered into the multivariable model. Transgender identity, coping self-efficacy (mediator variable), transphobic events, and the interaction terms were explanatory variables. The model was subsequently reduced; remaining effects were significant at $p<0.05$.

Depression symptoms and combined discrimination—Although interaction terms are commonly used to examine intersectionality in quantitative research, this approach subjects intersectionality to methodological and statistical limitations[2], and does not account for intersectionality as a unique construct with irreducible components (L. Graham, 2013, personal communication, January 16). In this study an alternative approach was taken: high-low binaries were developed from both the racist and transphobic events measures and three categorical variables of combined discrimination were subsequently created (see "Measures Used"). Simple logistic regressions were run to compare odds of depression symptoms for participants coded as experiencing more combined discrimination, to odds of depression symptoms among participants coded as experiencing less combined discrimination. This allowed assessment of how experiencing more discrimination intersectionally associates with depression symptom odds.

[2]Detecting interactions requires additional predictor variables to be added to an equation, which increases the sample size necessary to detect an existing effect.

Results

Descriptive statistics and correlations of demographic variables with depression symptoms

Table I summarizes descriptive statistics of the participants. No significant relationships were found between depression symptoms and race, education level, income category, or estimated age. Due to their substantive importance, estimated age, race, and income were nonetheless entered into the initial multivariate models as potential control variables for lifetime racism and transphobia experiences. Table II shows relevant cross-tabular frequency tables.

Depression symptoms and exposures to racism and transphobia

Transphobic and racist events were statistically significant in initial multivariable logistic regression models with racist and transphobic events as explanatory variables. Backward elimination favored two simple logistic models in which exposure to racist events and transphobic events were, respectively, associated with increased odds of depression symptoms. In the simple logistic regression model with exposure to racist events fitted to a depression symptoms outcome, each unit increase in exposure to racist events was associated with a 3 percent increased odds of depression symptoms (OR = 1.03; 95 percent CI = 1.001, 1.07; $\chi^2(1) = 4.42$; $p = 0.04$). In the simple logistic regression model with exposure to transphobic events fitted to a depression symptoms outcome, each unit increase in exposure to transphobic events was also associated with a 3 percent increased odds of depression symptoms (OR = 1.03; 95 percent CI = 1.002, 1.07; $\chi^2(1) = 4.48$; $p = 0.03$). Table III displays the simple and initial multivariable logistic analyses of depression symptoms and exposures to racist and transphobic events.

Depression symptoms, transgender identity, and coping self-efficacy

In a linear regression model increases on the transgender identity measure showed a statistically significant positive association with increased coping self-efficacy ($B = 17.74$; SE = 3.93; 95 percent CI = 9.93, 25.56; $t(84) = 4.52$; $\beta = 0.44$; $p<0.0001$). In the simple analyses of transgender identity and coping self-efficacy, respectively, fitted to depression symptoms, transgender identity and coping self-efficacy were associated with a statistically significant decreased odds of depression symptoms (see Table IV). Transgender identity, however, lost its statistical significance in the multivariable model, suggesting coping self-efficacy may mediate the association of transgender identity to depression symptoms[3]. Partial mediation was indicated when assessing a mediation model with transgender identity (independent variable), coping self-efficacy (mediator variable), and depression symptoms (outcome variable). In this mediation model the direct effect of transgender identity on depression symptoms was −0.52 (95 percent CI = −1.16, 0.12; $p = 0.11$), whereas the indirect effect of transgender identity on depression symptoms mediated by coping self-efficacy was −0.33 (Bootstrap-based 95 percent CI −0.81, −0.05). The possibility that

[3]According to Baron and Kenny (1986) conditions for partial mediation may exist when an independent variable explains an outcome variable and a mediator variable, and when the independent and mediator variables jointly explain the outcome variable. For a more detailed explanation of mediation that includes causal inference, binary outcome and mediator variables, and interaction effects with covariates please see Valeri and VanderWeele (2013).

coping self-efficacy moderated a relationship between transgender identity and depression symptoms was assessed using an interaction term, but no evidence for interaction was found ($p = 0.25$). Table V shows output for assessment of mediation.

Depression symptoms and transphobic events, with adjustment

A multivariable logistic regression model of transphobic events, transgender identity, and coping self-efficacy (mediator variable) was fit to a depression symptoms outcome. Interaction terms between transphobic events and transgender identity, and transphobic events and coping self-efficacy, were created and entered into the model as a second step; however, no statistically significant interactions were found, and the interaction terms were thus dropped. The mediator variable was also dropped to adjust for the total effect of transgender identity on transphobic events and depression symptoms. Without the mediator variable and interaction terms, each unit increase in the transphobic events measure was associated with a 4 percent statistically significant increase in depression symptom odds (OR = 1.04; 95 percent CI = 1.01, 1.08; $\chi^2(1) = 6.50$; $p = 0.01$), whereas each unit increase in the transgender identity scale was associated with a 55 percent statistically significant decrease in depression symptom odds (OR 0.45; 95 percent CI = 0.25, 0.78; $\chi^2(1) = 8.51$; $p = 0.0035$). It may be relevant that the effect of transphobic events and transgender identity in the reduced model was similar to the effect of these variables observed earlier in the study (see Tables III and IV). Such consistent behavior could suggest that transphobic events and transgender identity operate independently on depression symptoms. Table VI shows output for the multivariable model without interaction terms and Figure 2 shows a conceptual diagram.

Depression symptoms and combined discrimination

Participants were grouped into three categories, with those coded as experiencing low racism and transphobia (low combined discrimination) as the reference group. In comparison with this reference group, participants coded for medium combined discrimination had higher odds of depression symptoms which lacked statistical significance (OR = 1.77; 95 percent CI = 0.63, 4.99; $\chi^2(1) = 1.18$; $p = 0.28$). Participants coded for high combined discrimination, however, in comparison to the reference group, had a statistically significant increased odds of depression symptoms (OR = 3.19; 95 percent CI = 1.11, 9.66; $\chi^2(1) = 4.61$; $p = 0.03$). Table VII contains relevant output on the analysis of combined discrimination and depression symptoms.

Discussion

Analyses found that experiences of transphobic and racist events independently associated with increased odds of depression symptoms, and that greater combined discrimination associated with increased odds of depression symptoms. These results add to the growing body of literature on the health effects of experiencing discrimination, and suggest that belonging to multiple marginalized groups influences how discrimination affects health. Although the combined discrimination measure is not a true measure of intersectionality, it does allow consideration of how discriminations can synergistically affect health, without needing data from as many research participants as would be required for use with an

interaction term. Public health as a discipline is just beginning to acknowledge intersectionality. This study supports public health acknowledging and operationalizing intersectionality in qualitative and quantitative research. Measures sensitive to and reflective of different intersectionalities, such as those experienced by racial and sexual minorities, can be developed using critical race frameworks (Ford and Airhihenbuwa, 2010; Graham *et al.*, 2011a).

Analyses also found that having a positive attitude about being transgender, and a greater understanding of what role being transgender has in one's life, associated with more coping self-efficacy, which in turn was associated with decreased odds of depression symptoms. The degree to which coping self-efficacy was associated with decreased odds of depression symptoms was statistically significant, but low according to considerations (i.e. high base risk and or >0.33) laid out by Ferguson (2009). It is likely other variables, such as dimensions of subjective social support, have a stronger association with depression symptoms either directly or in relationship with transgender identity (George *et al.*, 1989). Identifying such variables, along with their possible relationships to transgender identity, could have important implications for intervention design and could add to the literature on minority stress, resilience, and stress and coping.

Separate models suggested both transgender identity and exposure to transphobic events associate with depression symptoms. Interactions of transgender identity and coping self-efficacy on the relationship between transphobic events and depression symptoms were tested but not found, suggesting independent and opposite influences of transgender identity and transphobic events on depression symptoms. This may be an artifact of a small sample size (i.e. low power to find interactions), but it is possible that the observed effect of transphobic events is the result of experiencing external discrimination, whereas the observed effect of transgender identity actually reflects an effect of not internalizing stigma. In this case, transgender identity may be antecedent to not internalizing stigma. Some research, such as

Graham *et al.* (2011b), suggests positive regard about one's minority identity can moderate or counteract a relationship of internalized stigma to depression symptoms. Positing that transgender identity, by way of not internalizing stigma, and exposure to transphobic events independently affects depression symptoms may concur with literature suggesting independent health effects of internalized and external stigma (Quinn and Chaudoir, 2009).

Implications for interventions and programs

A distinct influence of discriminatory events on depression symptoms separate from that of transgender identity suggests programs might foster trans women's identity development, while also addressing discrimination in society. Programs that support trans women's identity development might be patterned after emerging interventions for trans women, such as Sheroes or Life Skills, which discuss transgender identity (Garofalo *et al.*, 2012; Sevelius *et al.*, 2013). Because transgender identity may refer to social group as well as to gender identity, and because trans women posses other intersecting social group identities, successful programs can use participant-focused approaches to help trans women develop their unique identities, transgender or otherwise. Sheroes is currently developing a peer-led,

small-group level intervention by Sevelius (PI) to decrease trans women's health risk behaviors, and increase access to gender affirming services. The Sheroes intervention combines a psychosocial intervention to increase trans women's social support, pride in identity, and coping skills, with efforts supported by the Center of Excellence for Transgender Health to increase trans women's access to transgender-supportive health care. Future programs for trans women can also advocate for changes to address discrimination against transgender people and people of color in employment, housing, health care, public accommodations, and government issued documents. To engender comprehensive change, educational programs that introduce and model neutrality or acceptance of sex and gender diversity in schools and workplaces could also be promoted (J. Green, 2012, personal communication, August 17). Such programs might promote health by combating the systematic cisnormativity and stigma encountered by trans people, particularly trans people of color. Transgender people should not be invisible in institutional and informational sectors of society (Bauer *et al.*, 2009; Institute of Medicine, 2011). Mental health, medical, and public health professionals should all have access to information on transgender people, especially transgender people of color, and their concerns as part of initial and continuing education.

Implications for research

Because syndemic, or co-occurring, relationships between depression and health outcomes such as HIV seroprevalence have been observed, transgender identity may carry important implications for other health outcomes and ought to be researched further (Operario and Nemoto, 2010; Stall *et al.*, 2003). This study posited that transgender identity referred primarily to transgender social group identity. Besides referencing a social group identity, transgender identity could reference gender identity, or measure feelings of social connectedness; someone might identify as transgender on the basis of their gender identity, life experience, or social identity. To refine our understanding of these constructs and operationalize them effectively in research, additional studies can explore what being transgender, and transgender identity, means to trans people. If minority identity helps individuals make sense of their marginalization and avoid internalizing stigma, future studies might additionally explore identity and meaning based coping with racism, sexism, and transphobia/cisnormativity (DiFulvio, 2011). Distinct influences of internalized stigma and discriminatory events could be explored in such studies, and discrimination measures centered on the experiences of trans people of color can be developed and used.

Study limitations

Limitations of the study are that a small sample size of trans women was used, which limits statistical power and generalizability of results, that effects over time were not assessed, so that causal inferences could not be made, and that omitted variables could not be ruled out as influencing the mediated effect of transgender identity on depression symptoms. However, given the difficulty of recruiting transgender persons of color in research studies, the sample size in this study is meaningful in context and represents an important initial study of the interrelationships among constructs such as depression, coping self-efficacy, racism, and transphobia. Moreover, an inability to show causality is an inherent limitation to the cross-sectional study design; results from this study can be interpreted as hypothesis generating

and future longitudinal research can be employed. While trans men of color were not included in this study, future research might explore similarities and differences in combined discrimination and its health effects between trans men and women of color. This study is consistent with qualitative research on resilience processes among transgender people (Singh and McKleroy, 2010; Singh *et al.*, 2011); as such, it suggests interesting future realms of research while highlighting an important role that social group identity may play in stress and coping responses.

Conclusion

This study found positive associations of experiencing racist and transphobic events, and combined discrimination, with depression symptoms. Given the positive association of combined discrimination with depression symptoms, additional research can use a critical race framework to develop discrimination measures which center and acknowledge the diverse experiences of multiple minorities. A structural determinants approach could examine how institutionalized racism, transphobia, and cisnormativity affect the health of trans women of color. The study also found a separate negative association between transgender identity and depression symptoms. Transgender identity likely references a social group identity rather than a gender identity; future research with transgender people can explore social group identity beyond gender or transition. An intersectionality approach in such research might respectfully highlight diversity among trans people, and better acknowledge the needs of trans women of color.

Acknowledgments

The authors wish to thank Louis Graham for reviewing draft manuscripts, Jamison Green for offering input on policy interventions, Sunho Jung for sharing MATLAB codes used in regularized exploratory factor analysis, Angel Ventura for recruiting and interviewing participants, and Sheroes participants for sharing their time and stories. Sheroes is supported by NIH/NIMH grant No. K08MH085566 (Sevelius, PI). This analysis of Sheroes data was supported by an internship grant to Kevin Jefferson from the University of Michigan School of Public Health department of Health Behavior and Health Education. This grant provided funding for the corresponding author to travel and live in San Francisco while beginning work on this analysis.

References

Balzer, C.; Hutta, JS.; Adrian, T.; Hyndal, P.; Stryker, S. Transrespect versus Transphobia Worldwide: A Comparative Review of the Human-rights Situation of Gender-variant/ Trans People. Transgender Europe (TGEU); Berlin: 2012.

Bandura A. Human agency in social cognitive theory. American Psychologist. 1989; 44(9):1175–84. [PubMed: 2782727]

Baron RM, Kenny DA. The moderator-mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. Journal of Personality and Social Psychology. 1986; 51(6):1173–82. [PubMed: 3806354]

Bauer GR, Hammond R, Travers R, Kaay M, Hohenadel KM, Boyce M. 'I Don't Think This Is Theoretical; This Is Our Lives': how erasure impacts health care for transgender people. Journal of the Association of Nurses in AIDS Care. 2009; 20(5):348–61. [PubMed: 19732694]

Chesney MA, Neilands TB, Chambers DB, Taylor JM, Folkman S. A validity and reliability study of the coping self-efficacy scale. British Journal of Health Psychology. 2006; 11(3):421–37. [PubMed: 16870053]

Clements-Nolle K, Marx R, Guzman R, Katz M. HIV prevalence, risk behaviors, health care use, and mental health status of transgender persons: implications for public health intervention. American Journal of Public Health. 2001; 91(6):915–22. [PubMed: 11392934]

Crenshaw K. Mapping the margins: intersectionality, identity politics, and violence against women of color. Stanford Law Review. 1991; 43(6):1241–99.

Crenshaw, K. Intersectional elisions as conditions of neoliberal possibility. talk presented at the Thinking Intersectionality Conference, Michigan State University, East Lansing; April 6; 2013.

Crocker J, Luhtanen R, Blaine B, Broadnax S. Collective self-esteem and psychological well-being among White, Black, and Asian College Students. Personality and Social Psychology Bulletin. 1994; 20(5):503–13.

Díaz RM, Ayala G, Bein E. Sexual risk as an outcome of social oppression: data from a probability sample of Latino gay men in three US cities. Cultural Diversity and Ethnic Minority Psychology. 2004; 10(3):255–67. [PubMed: 15311978]

DiFulvio GT. Sexual minority youth, social connection and resilience: from personal struggle to collective identity. Social Science & Medicine. 2011; 72(10):1611–7. [PubMed: 21497970]

Fergus S, Zimmerman MA. Adolescent resilience: a framework for understanding healthy development in the face of risk. Annual Review of Public Health. 2005; 26(1):399–419.

Ferguson CJ. An effect size primer: a guide for clinicians and researchers. Professional Psychology: Research and Practice. 2009; 40(5):532–8.

Folkman S, Moskowitz JT. Coping: pitfalls and promise. Annual Review of Psychology. 2004; 55(1): 745–74.

Ford CL, Airhihenbuwa CO. The public health critical race methodology: praxis for antiracism research. Social Science & Medicine. 2010; 71(8):1390–8. [PubMed: 20822840]

Garofalo R, Johnson AK, Kuhns LM, Cotten C, Joseph H, Margolis A. Life skills: evaluation of a theory-driven behavioral HIV prevention intervention for young transgender women. Journal of Urban Health. 2012; 89(3):419–31. [PubMed: 22223033]

George LK, Blazer DG, Hughes DC, Fowler N. Social support and the outcome of major depression. The British Journal of Psychiatry. 1989; 154(4):478–85. [PubMed: 2590779]

Graham L, Brown-Jeffy S, Aronson R, Stephens C. Critical race theory as theoretical framework and analysis tool for population health research. Critical Public Health. 2011a; 21(1):81–93.

Graham LF, Aronson RE, Nichols T, Stephens CF, Rhodes SD. Factors influencing depression and anxiety among black sexual minority men. Depression Research and Treatment. 2011b; 2011(2011):1–9.

Grant, JM.; Mottet, L.; Tanis, JE.; Harrison, J.; Herman, J.; Keisling, M. Injustice at Every Turn: A Report of the National Transgender Discrimination Survey. National Center for Transgender Equality; Washington, DC: 2011.

Hatcher, L. A Step-by-Step Approach to Using the SAS System for Factor Analysis and Structural Equation Modeling. SAS Institute; Cary, NC: 1994.

Hayes, A. [accessed June 13, 2012] Process macro. 2012. available at: www.afhayes.com

Hendricks ML, Testa RJ. A conceptual framework for clinical work with transgender and gender nonconforming clients: an adaptation of the Minority Stress Model. Professional Psychology: Research and Practice. 2012; 43(5):460–7.

Herek GM, Garnets LD. Sexual orientation and mental health. Annual Review of Clinical Psychology. 2007; 3:353–75.

Institute of Medicine. The Health of Lesbian, Gay, Bisexual, and Transgender People: Building a Foundation for Better Understanding. National Academies Press; Washington, DC: 2011.

Jung S, Lee S. Exploratory factor analysis for small samples. Behavior Research Methods. 2011; 43(3):701–9. [PubMed: 21431996]

Kohout FJ, Berkman LF, Evans DA, Cornoni-Huntley J. Two shorter forms of the CES-D depression symptoms index. Journal of Aging and Health. 1993; 5(2):179–93. [PubMed: 10125443]

Landrine H, Klonoff EA. The schedule of racist events: a measure of racial discrimination and a study of its negative physical and mental health consequences. Journal of Black Psychology. 1996; 22(2):144–68.

Lazarus, RS.; Cohen, JB. Environmental stress. In: Altman, I.; Wohlwill, J., editors. Human Behavior and Environment. Plenum Press; New York, NY: 1977. p. 89-127.

Lombardi EL, Wilchins RA, Priesing D, Malouf D. Gender violence. Journal of Homosexuality. 2002; 42(1):89–101. [PubMed: 11991568]

(The) MathWorks Inc. MATLAB. The MathWorks Inc; Natick, MA: 2012.

Meyer D. Interpreting and experiencing anti-queer violence: race, class, and gender differences among LGBT hate crime victims. Race, Gender & Class. 2008; 15(3/4):262–82.

Meyer IH. Minority stress and mental health in gay men. Journal of Health and Social Behavior. 1995; 36(1):38–56. [PubMed: 7738327]

Meyer IH. Prejudice, social stress, and mental health in lesbian, gay, and bisexual populations: conceptual issues and research evidence. Psychological Bulletin. 2003; 129(5):674–97. [PubMed: 12956539]

Miller CT, Kaiser CR. A theoretical perspective on coping with stigma. Journal of Social Issues. 2001; 57(1):73–92.

National Coalition of Anti-Violence Programs. Lesbian Gay Bisexual Transgender Queer and HIV-Affected Hate Violence in 2012. NCAVP; New York, NY: 2013.

Nemoto T, Bödeker B, Iwamoto M. Social support, exposure to violence and transphobia, and correlates of depression among male-to-female transgender women with a history of sex work. American Journal of Public Health. 2011; 101(10):1980–8. [PubMed: 21493940]

Nemoto, T.; Operario, D.; Sevelius, J.; Keatley, J.; Han, L.; Nguyenm, H. Transphobia among transgenders of color; poster presented at the American Public Health Association Conference; Washington, DC. November 6–10; 2004. available at: www.caps.ucsf.edu/pubs/presentations/pdf/APHA_Nemoto.pdf

Nuttbrock L, Bockting WO, Hwahng S, Rosenblum A, Mason M, Marci M, Becker J. Psychiatric impact of gender-related abuse across the life course of male-to-female transgender persons. Journal of Sex Research. 2010; 47(1):12–23. [PubMed: 19568976]

Operario D, Nemoto T. HIV in transgender communities: syndemic dynamics and a need for multicomponent interventions. Journal of Acquired Immune Deficiency Syndromes. 2010; 55(S2):S91–S93. [PubMed: 21406995]

Phinney JS. The multigroup ethnic identity measure a new scale for use with diverse groups. Journal of Adolescent Research. 1992; 7(2):156–76.

Quinn DM, Chaudoir SR. Living with a concealable stigmatized identity: the impact of anticipated stigma, centrality, salience, and cultural stigma on psychological distress and health. Journal of Personality and Social Psychology. 2009; 97(4):634–51. [PubMed: 19785483]

Radloff LS. The CES-D scale: a self-report depression scale for research in the general population. Applied Psychological Measurement. 1977; 1(3):385–401.

Rotondi NK, Bauer G, Scanlon K, Kaay M, Travers R, Travers A. Prevalence of and risk and protective factors for depression in female-to-male transgender Ontarians: trans PULSE project. Canadian Journal of Community Mental Health. 2011a; 30(2):135–55.

Rotondi NK, Bauer GR, Travers R, Travers A, Scanlon K, Kaay M. Depression in male-to-female transgender Ontarians: results from the Trans PULSE Project. Canadian Journal of Community Mental Health (Revue canadienne de santé mentale communautaire). 2011b; 30(2):113–33.

SAS Institute. SAS Software (Version 9.2). SAS Institute; Cary, NC: 2008.

SAS Institute. SAS Software (Version 9.3). SAS Institute; Cary, NC: 2011.

Serano, J. Whipping Girl: A Transsexual Woman on Sexism and the Scapegoating of Femininity. Seal Press; Emeryville, CA: 2007.

Sevelius, J.; Castro, D.; Ventura, A.; Johnson, M. Sheroes: culturally relevant sexual risk reduction among high-risk transgender women; Abstract No TUPE370, presented at the 19th International AIDS Conference; Washington, DC. July 22–27; 2013. available at: www.iasociety.org/Abstracts/A200747101.aspx

Singh AA, McKleroy VS. 'Just Getting Out of Bed Is a Revolutionary Act': the resilience of transgender people of color who have survived traumatic life events. Traumatology. 2010; 17(2): 34–44.

Singh AA, Hays DG, Watson LS. Strength in the face of adversity: resilience strategies of transgender individuals. Journal of Counseling & Development. 2011; 89(1):20–7.

Stall R, Mills TC, Williamson J, Hart T, Greenwood G, Paul J, Pollack L, Binson D, Osmond D, Catania JA. Association of co-occurring psychosocial health problems and increased vulnerability to HIV/AIDS among urban men who have sex with men. American Journal of Public Health. 2003; 93(6):939–42. [PubMed: 12773359]

Stotzer RL. Violence against transgender people: a review of United States data. Aggression and Violent Behavior. 2009; 14(3):170–9.

Tajfel H. Social identity and intergroup behavior. Social Science Information. 1974; 13(2):65–93.

Taylor SE, Stanton AL. Coping resources, coping processes, and mental health. Annual Review of Clinical Psychology. 2007; 3(1):377–401.

Valeri L, VanderWeele TJ. Mediation analysis allowing for exposure-mediator interactions and causal interpretation: theoretical assumptions and implementation with SAS and SPSS macros. Psychological Methods. 2013; 18(2):137–50. [PubMed: 23379553]

Zea MC, Reisen CA, Poppen PJ. Psychological well-being among Latino lesbians and gay men. Cultural Diversity and Ethnic Minority Psychology. 1999; 5(4):371–9.

Biographies

Kevin Jefferson, MPH, is the health effects of social identities and discrimination. He is currently a doctoral student at Emory University's Rollins School of Public Health. He began analysis for this paper during an internship with Jae Sevelius, PhD while he was a MPH student.

Torsten B. Neilands, PhD is a Professor at the Center for AIDS Prevention Studies in the Department of Medicine at UCSF and has headed the Center's Methods Core since 2003. He has over 20 years of statistical consulting and data analysis experience in the university environments and is particularly conversant with multivariate statistical models with a special interest in structural equation modeling, confirmatory factor analysis, and survey scale development. He also has considerable experience with longitudinal data analysis methods such as growth curve analysis, multilevel (hierarchical linear) modeling, and survival analysis. Dr Neilands also has experience in the design and analysis of multiple HIV-related behavioral randomized trials and ongoing experience in the analysis of longitudinal immunologic HIV data. Dr Neilands holds a master's degree equivalent in Quantitative Methods and Psychometrics from the University of Texas at Austin and a PhD in Psychology from the same institution, conferred in 1993. He has served as a senior statistician, statistical co-investigator, or statistical consultant on over 50 NIH- and CDC-funded projects relating to HIV/AIDS prevention at the Center for AIDS Prevention Studies at UCSF.

Jae Sevelius, PhD is an Assistant Professor with the Center for AIDS Prevention Studies (CAPS) in the Department of Medicine at the University of California, San Francisco, and a Co-Principal Investigator at the Center of Excellence for Transgender Health, which promotes increased access to culturally competent health care for transgender people through research, training, and advocacy. Dr Sevelius is a Principal Investigator of a NIH/NIMH-funded project to assess HIV risk behaviors and protective factors among transgender women of color to develop a culturally specific HIV prevention intervention for this high-risk, underserved population. With funding from the California HIV/AIDS Research Program (CHRP), building on work of the Transitions Project and in collaboration with API Wellness' TRANS:THRIVE program, Dr Sevelius is also working to adapt and

evaluate the evidence-based HIV prevention intervention SISTA (Sisters Informing Sisters about Topics on AIDS) for transgender women of color. Also funded by the CHRP, Dr Sevelius is conducting a qualitative investigation of the barriers to HIV treatment engagement and adherence among transgender women living with HIV. With funding from the UCSF Academic Senate and a CAPS Innovative Research Award, Dr Sevelius recently developed and piloted a transgender specific intervention to improve HIV treatment engagement and adherence.

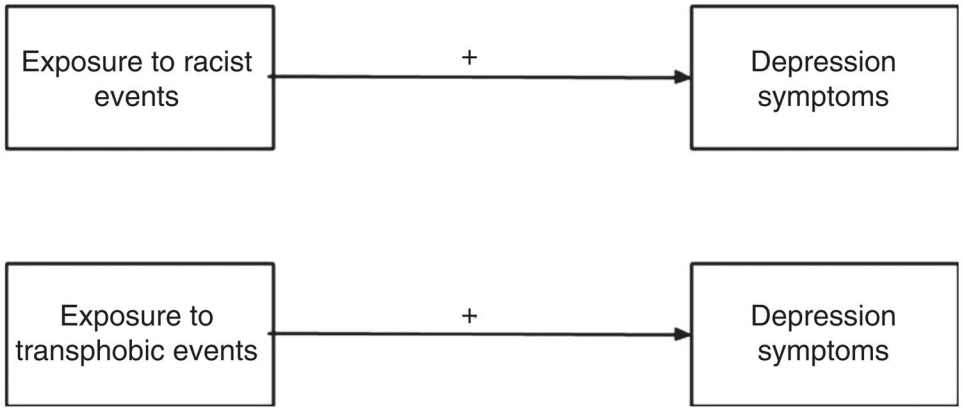

Figure 1.
Proposed relationships of racist and transphobic events to depression symptoms

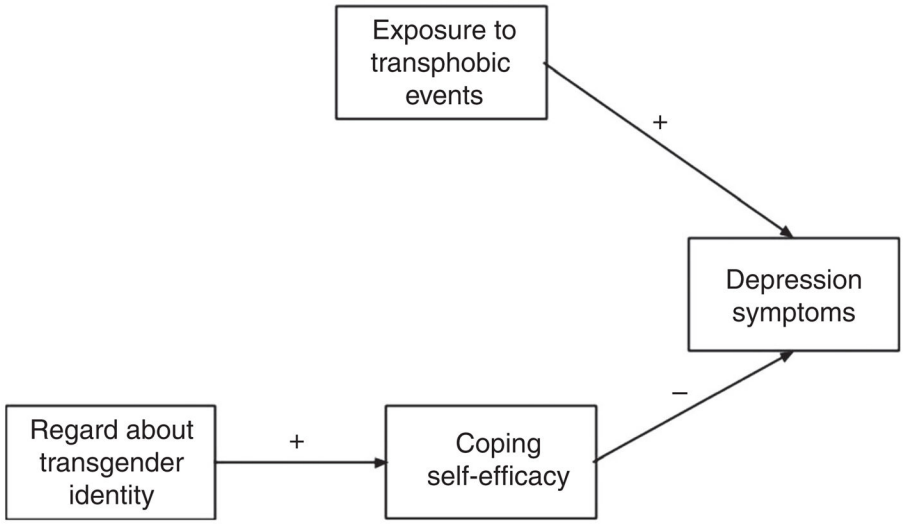

Figure 2.

Proposed relationships of transphobic events, transgender identity, and coping self-efficacy to depression symptoms

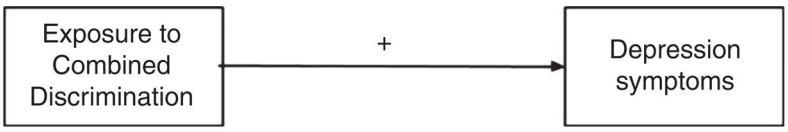

Figure 3.
Proposed relationship of combined discrimination to depression symptoms

Ethn Inequal Health Soc Care. Author manuscript; available in PMC 2014 October 22.

Table I

Demographics and descriptive measures

	n (%)				
Races reported					
African-American	69 (70)				
Latina	25 (26)				
Pacific Islander	5 (5)				
Asian	8 (8)				
Native American	7 (7)				
White	13 (13)				
Multiracial	22 (23)				
Genders reported					
Female	14 (14)				
Transgender Female	87 (89)				
Education level					
Less than high school	26 (27)				
Finished high school/GED	27 (28)				
Technical or vocational school	1 (1)				
Some college, AA, or technical degree	38 (39)				
College degree or higher	5 (5)				
Monthly income category					
$0–500	19 (20)				
$501–1,000	40 (42)				
$1,001–2,000	30 (31)				
$2,001–3,000	6 (6)				
$3,001–4,000	1 (1)				
$4,001 +	0 (0)				
	n	*Median*	*Mean*	*SD*	*Range*
Estimated age	97	45	42.84	9.82	23–66
Rescaled CES-D	90	18.18	18.85	11.61	0–50.91
Lifetime racist events	93	31	32.33	13.71	13–69

	n (%)				
Transphobia	95	35	36.61	13.44	13–69
Transgender Identity	97	4.14	4.00	0.83	1.71–5
Coping self-efficacy	86	114.50	107.28	33.50	7–150

Table II

Frequency tables of depression symptoms by race, gender, education level, and income category raw numbers with percent of total reported

	Depression symptoms		
	No	**Yes**	**Total**
Race/ethnicity			
African-American	30 (31)	24 (25)	54 (56)
Not African-American	27 (28)	16 (16)	43 (44)
Total	57 (59)	40 (41)	97 (100)
Gender			
Female	6 (6)	8 (8)	14 (14)
Transgender female	52 (51)	35 (35)	87 (86)
Total	58 (57)	43 (43)	101 (100)
Education			
Less than high school	14 (14)	12 (12)	26 (27)
Finished high school/GED	17 (18)	10 (10)	27 (28)
Technical or vocational school	1 (1)	0 (0)	1 (1)
Some college, AA, or technical degree	20 (21)	18 (19)	38 (39)
College degree or higher	5 (5)	0 (0)	5 (5)
Total	57 (59)	40 (41)	97 (100)
Monthly income			
$0–500	12 (13)	7 (7)	19 (20)
$501–1,000	19 (20)	21 (22)	40 (42)
$1,001–2,000	20 (21)	10 (10)	30 (31)
$2,001–3,000	4 (4)	2 (2)	6 (6)
$3,001–4,000	1 (1)	0 (0)	1 (1)
$4,001 +	0 (0)	0 (0)	0 (0)
Total	56 (58)	40 (42)	96 (100)

Table III

Relationships of racism and transphobia to depression symptoms, multivariable, and bivariate associations

Parameter	Odds ratio estimate	PL 95% CI	LR χ^2 (df), p-value
Racism	1.03	1.00, 1.07	3.87(1), 0.049
African-American race	1.39	0.58, 3.38	0.55(1), 0.46
Income category	0.87	0.53, 1.41	0.33(1), 0.56
Estimated age	1.01	0.96, 1.05	0.04(1), 0.84
Likelihood ratio test for global null hypothesis of all effects being zero: 5.14(4), p =0.27, n =92			
Transphobia	1.03	1.00, 1.07	3.42(1), 0.048
African-American race	1.20	0.51, 2.87	0.17(1), 0.68
Income category	0.84	0.51, 1.36	0.51(1), 0.48
Estimated age	1.01	0.96, 1.05	0.05(1), 0.82
Likelihood ratio test for global null hypothesis of all effects being zero: 4.97(4), p =0.29, n =94			
Racism	1.03	1.001, 1.07	4.42(1), 0.04
n =93			
Transphobia	1.03	1.002, 1.07	4.48(1), 0.03
n =95			

Notes: PL, profile likelihood; LR, likelihood ratio. The last two ORs for racism and transphobia are unadjusted; all other ORs are adjusted

Table IV

Relationships between transgender identity, coping self-efficacy, and depression symptoms, multivariable and bivariate associations

Parameter	Odds ratio estimate	PL 95% CI	LR χ^2 (df), p-value
Transgender identity	0.52	0.30, 0.86	6.59(1), 0.01
LN =97			
Coping self-efficacy	0.98	0.96, 0.99	10.92(1), 0.001
n =86			
Transgender identity	0.60	0.31, 1.12	2.59(1), 0.11
Coping self-efficacy	0.98	0.97, 0.997	5.68(1), 0.02
Likelihood ratio for global null hypothesis of all effects being zero: 13.51(2), $p = 0.001$, $n = 86$			

Notes: PL, profile likelihood; LR, likelihood ratio. The last two ORs for racism and transphobia are adjusted; the first two ORs are unadjusted

Ethn Inequal Health Soc Care. Author manuscript; available in PMC 2014 October 22.

Table V

Mediation analysis of coping self-efficacy to transgender identity and depression symptoms Mediation Model

Parameter	**Coefficient**	**SE**	**Z**	**95% CI**	**p-value**
Constant	3.63	1.38	2.64	0.94, 6.33	0.01
Coping self-efficacy	−0.02	0.01	−2.30	−0.03, −0.003	0.02
Transgender identity	−0.52	0.33	−1.58	−1.16, 0.12	0.11
Direct effect of X on Y	*Effect*				
	−0.52	0.33	−1.58	−1.16, 0.12	0.11
Indirect effect of X on Y	*Effect*	*Bootstrap SE*	*Bootstrap 95% CI*		
Coping self-efficacy	−0.33	0.20	−0.81, −0.05		
−2LL =101.92 Model LL = 13.51 $n = 86$					

Notes: X, transgender identity, M, coping self-efficacy, Y, depression symptoms

Table VI

Multivariable associations of transphobia, transgender identity, and coping self-efficacy to depression symptoms

Parameter	Adjusted odds ratio estimate	PL 95% CI	LR χ^2 (df), p-value
Transgender Identity	0.55	0.29, 1.05	3.24(1), 0.07
Coping self-efficacy	0.98	0.97, 0.999	4.34(1), 0.04
Transphobia	1.04	0.997, 1.08	3.28(1), 0.07
Likelihood ratio for global null hypothesis for all effects being zero: 16.57(3), p =0.0009, n =85			

Notes: PL, profile likelihood; LR, likelihood ratio

Table VII

Relationships of combined discrimination to depression symptoms, bivariate associations

Parameter	Odds ratio estimate	PL 95% CI	LR χ^2 (df), p-value
Medium combined discrimination (n = 22)	1.77	0.63,4.99	1.18(1), 0.28
High combined discrimination (n =20)	3.19	1.11, 9.66	4.61(1), 0.03

Notes: PL, profile likelihood; LR, likelihood ratio; low combined discrimination (n =50) is reference group