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Health Vulnerability Model for Latinx Sexual and Gender Minorities: Typologies with Socioeconomic Stability, Health Care Access, and Social Characteristics Indicators

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Keywords

Latinx sexual and gender minorities, LGBTQ+ health, vulnerability, vulnerable populations, latent class analysis

Acknowledgements/Disclaimers/Disclosures

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Abstract

Vulnerability can undermine positive health outcomes and challenge healthcare services access. However, to date, vulnerable populations research has been limited by overly broad definitions, lack of clear indicators, and failure to explore subtypes of vulnerability. Informed by literature and theory, this analysis used a specific operationalization of health vulnerability to identify typologies among a sample of Latinx sexual and gender minorities. We analyzed baseline data from Latinx sexual and gender minorities ($N = 186$) recruited for a community-based HIV intervention. We performed latent class analysis to operationalize vulnerability using eight socioeconomic stability, health care access, and social characteristics indicators. We identified three typologies of vulnerability from our sample: Low Education and High Social Support (63.4% of sample), High Education and Year-round Employment (18.8%), and High Education and High Discrimination (17.7%). Using specific indicators produced more nuanced vulnerability typologies which, after further testing, can assist in informing tailored health promotion interventions.

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Introduction

Vulnerable populations, broadly defined, are population groups who are more likely to be exposed to risks associated with poor health status or outcomes compared to the general population (Aday, 1994; Arora et al., 2015; Flaskerud & Winslow, 1998; Shi & Stevens, 2005). Despite this accepted definition of vulnerability, increased clarity about the construct is needed to identify the specific characteristics of those who are vulnerable, and target needed health promotion efforts (Grabovschi et al., 2013). Vulnerable populations research to date—largely in the fields of public health, nursing, and social work—has been limited by the

lack of specificity of the construct of vulnerability, lack of guidance for choosing appropriate vulnerability indicators (measurable characteristics), and limited exploration of subgroups of vulnerability within a particular population group (Aday, 1994; Arora et al., 2015; Flaskerud & Winslow, 1998; Shi, Stevens, Faed, & Tsai, 2008; Shi, Stevens, Lebrun, et al., 2008). Specific indicators will provide a foundation for understanding how the construct of vulnerability operates to affect health outcomes, which will advance vulnerability in research and practice and aid in developing conceptual frameworks for identifying groups who are uniquely vulnerable. In other words, two important steps are necessary:

(1) the identification of valid vulnerability indicators (the importance of which may fluctuate based on the specific contexts of the population under study), and (2) the examination of whether there exist distinct variations of vulnerability within that population.

The literature has treated Latinx (i.e., a gender-neutral term used in lieu of Latino and Latina) in the United States, and particularly Latinx sexual and gender minorities (i.e., gay-identified persons, men who have sex with men [MSM] but who do not self-identify as gay, and gender-nonconforming or transgender persons), as a vulnerable population (Bauermeister, 2007; Erausquin et al., 2009; Rhodes, Martinez, et al., 2013, 2017; Sun et al., 2015; Tanner et al., 2014). Latinx sexual and gender minorities are frequently considered a vulnerable population based on: their multiple, marginalized identities including race/ethnicity, sexual orientation, gender, and immigrant status (Gilbert & Rhodes, 2014); their disproportionate burden of poverty (Pérez-Escamilla, 2010); and their demonstrable group-level disparities in health compared with non-Latinx white and heterosexual peers (Turra & Goldman, 2007; Vega et al., 2009). In addition, Latinx increasingly live in areas of the United States with limited histories of foreign-born populations, such as the southern United States (Brown & Patten, 2014; Ennis et al., 2011; Terrazas, 2011; U.S. Census Bureau, 2016). These new settlement areas may lack the infrastructure to meet the unique needs and priorities of Latinx (e.g., bilingual and bicultural services), and in some cases are characterized by high levels of anti-immigration sentiment (Barrington et al., 2012; Flippen & Parrado, 2015; Rhodes et al., 2011, 2015). Thus, Latinx sexual and gender minorities in new settlement areas, such as North Carolina, may face particularly compounded vulnerability (Diaz, 1998;

Thing, 2010) and poor health outcomes (Dolwick Grieb et al., 2015; Flippen & Parrado, 2015). These characteristics and identities (e.g., related to sexual orientation, gender identity, and income) can intersect to shape health and influence the barriers and opportunities that promote health, thus it is crucial to consider the combination of characteristics altogether that contribute to health vulnerability (Van Schuylenbergh et al., 2018).

There are a multitude of indicators that contribute to the vulnerability of Latinx as a whole (Gilbert & Rhodes, 2014; Pérez-Escamilla et al., 2010; Turra & Goldman, 2007; Vega et al., 2009). However, given the diversity of this population, measurable indicators are useful to examine and understand the subgroups of vulnerability that exist within this population to advance understanding of both the target population and the construct of vulnerability (Gilbert & Rhodes, 2014). Rather than simply considering whether a population group is vulnerable or not vulnerable based on a few characteristics, from a provider and program planner perspective it is also important to look within a population group and assess whether there are gradations, or typologies, of vulnerability that take into account a variety of characteristics. Advancing a health vulnerability model can help identify within- and across-group patterns in health outcomes and behaviors (Derose et al., 2007). It can also serve as a powerful tool to better understand and address the needs of the target population and promote health (Flaskerud & Winslow, 1998). If subgroups of vulnerability are to be ascertained, we must have measurable indicators of vulnerability. For Latinx sexual and gender minorities, we identified indicators from existing literature on social determinants of health and vulnerable populations theory (Derose et al., 2007; Dovidio et al., 2010; Gilbert & Rhodes, 2014; Katz et al., 2018; Tanner et al., 2014).

The purpose of this analysis was twofold: (1) to adapt Shi and colleagues' (Shi, Stevens, Faed, & Tsai, 2008) General Model of Vulnerability to develop a specific health vulnerability model for Latinx sexual and gender minorities, and (2) to test whether there are distinct subgroups of vulnerability within this target population. In our analysis of vulnerable subgroups, we included a variety of indicators across three proposed domains of vulnerability based on the existing literature on Latinx sexual and gender minorities, social determinants of health, and the General Model of Vulnerability (Shi, Stevens, Faed, & Tsai, 2008): (1) socio-economic stability (i.e., educational attainment and employment status); (2) health care access (i.e., routine check-ups); and (3) social characteristics (i.e., social support, acculturation, racial/ethnic and sexual discrimination, and internalized homonegativity) (Derose et al., 2007; Dovidio et al., 2010; Gilbert & Rhodes, 2014; Katz et al., 2018; Tanner et al., 2014). These indicators include both general (e.g., educational attainment) and sexual and gender minority-specific (e.g., acculturation and racial/ethnic and sexual discrimination) characteristics that shape vulnerability to health.

The present analysis delineates the approach to operationalize the construct of vulnerability using these select eight indicators among a sample of Latinx sexual and gender minorities to identify subgroups of health vulnerability. Accordingly, our research questions posed include: (1) What are appropriate indicators of health vulnerability among our sample of Latinx sexual and gender minorities? and (2) Using these indicators, what subgroups of health vulnerability emerge from our sample?

Methods

Participants and Data Collection

We examined baseline survey data from the HOLA intervention collected from November 2011 to July 2012 in North Carolina (NC), a new settlement state for foreign-born populations. HOLA was a social network intervention program, which used lay health advisors called 'Navegantes.' The intervention was designed to increase HIV testing and condom use among Spanish-speaking Latinx who identified as sexual and gender minorities (i.e., gay or bisexual men, other MSM, and male-to-female transgender) (Rhodes, Daniel, et al., 2013; Sun et al., 2014). Eligible participants had to self-identify as Latinx or Hispanic, be at least 18 years of age, report MSM behavior since at least age 18, and provide informed consent. The intervention recruited 21 Navegantes to participate in the study, who then each recruited 8 Latinx from their social networks. Both Latino sexual minority men ($n = 165$) and Latina transgender women ($n = 21$) were successfully recruited, for a total of 186 participants. The intervention and its evaluation were developed in response to community-identified needs and priorities by a community-based participatory research (CBPR) partnership comprised of lay community members, organization representatives, and university health professionals and researchers (Rhodes et al., 2014). The baseline assessment was completed by participants, but was also read aloud in Spanish by a male native Spanish-speaking, Mexican-origin staff member to address low literacy. The assessment took 45 to 90 minutes to complete, depending on the participant's responses and skip patterns. The

Institutional Review Boards of the University of North Carolina at Greensboro and Wake Forest School of Medicine approved the study protocols.

Measures

Sociodemographic characteristics.

Participants reported their demographic information, including: age; country of origin; sexual orientation; relationship status; approximate monthly income; and perceived health status on a 5-point scale from “excellent” (5) to “poor” (1) (Centers for Disease Control and Prevention [CDC], 2011).

Indicators of vulnerability. The indicator variables for the latent construct of vulnerability included eight variables across three domains (i.e., socioeconomic stability, health care access, and social characteristics): educational attainment, employment status, routine check-ups, social support level, acculturation level, perceived racial/ethnic discrimination, perceived sexual discrimination, and internalized homonegativity.

Socioeconomic stability domain.

Participants reported their highest level of educational attainment (dichotomized as less than high school vs. at least high school) and employment status (dichotomized as employed year-round vs. not employed year-round). We dichotomized these variables to reflect the natural cutpoint in participants’ responses and adopt similar cutpoints used in prior studies using this dataset (Sun et al., 2015; Tanner et al., 2014).

Health care access domain. Participants reported when they last saw a healthcare provider for a routine (not emergency) check-up (e.g., physical exam). Response options were: never, within past 6 months, within the past year, 1–2 years ago, and over 2 years ago. Routine check-up was dichotomized as within the past year vs. more than one year ago or never.

Social characteristics domain. Participants completed the 18-item Index of Sojourner’s Social Support (ISSS) (Ong & Ward, 2005), which has been explored for Latinx sexual minorities (Gilbert & Rhodes, 2012). For each item, participants reported how many people would provide socio-emotional support and instrumental support on a 5-point scale from “no one would do this” to “many people would do this.” Cronbach’s alpha was 0.98.

Participants completed the 12-item Short Acculturation Scale for Hispanics (Marin et al., 1987). This scale consists of three dimensions of acculturation (i.e., language use, media, and ethnic social relations or socialization) on a 5-point scale: Depending on the item, from “only Spanish” to “only English” or from “all Latinos/Hispanics” to “all Americans.” Cronbach’s alpha was 0.87.

Participants rated their levels of perceived racial/ethnic and sexual discrimination by completing a modified version of the Everyday Discrimination Scale (Williams et al., 1997), which has been validated across ethnic/racial groups (Kim et al., 2014). Participants reported whether they had in the past 12 months experienced 10 different types of discrimination (e.g., treated with less courtesy than other people) because of their race, ethnicity, or color (ethnic/racial discrimination) and because of their sexual identity or same-sex sexual behavior (sexual discrimination) with a “yes” or “no” response. We summed the number of “yes” responses, such that higher scores reflect greater experiences of discrimination. Cronbach’s alpha for racial/ethnic discrimination was 0.81, and for sexual discrimination 0.83.

Participants completed a shortened version of the Reactions to Homosexuality Scale to assess levels of internalized homonegativity (Smolenski et al., 2010). Participants rated their agreement to seven statements on a 7-point scale from “strongly

disagree” (1) to “strongly agree” (7). Cronbach’s alpha was 0.65.

Analysis

We conducted latent class analysis (LCA) to identify subgroups of health vulnerability in our sample of Latinx sexual and gender minorities. LCA is a statistical modeling method to identify a latent construct using indicator (observed) variables that represent response patterns in the data (Collins & Lanza, 2010; Nylund et al., 2007). LCA allows examination of whether homogenous latent classes (subgroups) can be identified within a larger heterogeneous group. We identified latent classes of health vulnerability through a multi-step model fitting process (Lubke & Muthén, 2005; Muthén & Muthén, 2000; Nylund et al., 2007). Model identification was examined by comparing the solution obtained across 1,000 sets of random starting values. The number of latent classes was selected based on multiple information criteria, including the Akaike information criterion (AIC) (Akaike, 1974), Bayesian information criterion (BIC) (Schwarz, 1978), sample-size adjusted BIC (SSA–BIC) (Sclove, 1987), the difference in the likelihood ratio test and its alternative based on bootstrapping (Lo–Mendell–Rubin adjusted likelihood ratio test [LMR adjusted LRT]) (Lo et al., 2001), and entropy (Larose et al., 2016). Optimal models were indicated by: minimum values of AIC, BIC, and SSA–BIC; entropy values greater than 0.8; and a small probability value for LMR adjusted LRT ($p < 0.05$). This analytic approach does not require participants to have complete data on all indicator variables to be included in the latent class analysis, enabling the maximum use of all data (Collins & Lanza, 2010). Missing data were handled with a full-information maximum likelihood (FIML) technique that assumes data are missing at random (Collins & Lanza, 2010). As Latina

transgender women may differ in their endorsement of the indicator variables (e.g., less educational attainment), we conducted a subgroup analysis in which only transgender women were included ($n = 21$). Statistical analyses were performed using IBM SPSS version 23 (Armonk, NY) and Mplus version 7.4 (Los Angeles, CA).

Results

Participant Characteristics

Demographic and behavioral characteristics of the 186 participants are shown in Table 1. On average, participants were 30 years of age ($SD = 7.3$). Approximately three-fourths (75.5%) were employed year-round, one-fourth (27.6%) had a monthly income of \$2,000 or greater, and over half (59.2%) had received a high school diploma or equivalent. The majority (75.3%) of participants identified as gay. Over half (68.4%) reported obtaining a routine check-up within the past year. On average, participants reported moderate levels of social support, acculturation, perceived racial/ethnic and sexual discrimination, and internalized homonegativity.

Latent Class Analysis

We compared models with two through six latent classes to identify the optimal model based on fit criteria, interpretability, and class separation. Based on the fit statistics, we selected the three-class model for its high class separation, interpretability, and meaningfulness of classes. Table 2 presents the fit statistics comparing the latent class models.

We used the probability of endorsements for each vulnerability indicator for further model identification. The estimated means or item-response probabilities represent the conditional probability of endorsing an

indicator given its membership in a latent class. We relied on these probabilities to label the latent classes by identifying those with the highest or lowest indicator endorsement and the largest differences across classes. The latent class characterized by the most participants was Class 1 (Low Education and High Social Support; 63.4% of the sample),

followed by Class 2 (High Education and Year-round Employment; 18.8%) and Class 3 (High Education and High Discrimination; 17.7%).

Table 3 presents the proportions of the sample in each latent class, and the estimated means or item-response probabilities for each indicator.

Table 1

Demographic and Behavioral Characteristics of Latinx Sexual and Gender Minorities

	<i>N</i> (%) or Mean \pm SD (Range)
Age (years)	30.1 \pm 7.4 (18–61)
Income level (monthly)	
Less than \$2,000	71 (72.4)
At least \$2,000	27 (27.6)
Employment status	
Employed year-round	74 (75.5)
Not employed year-round	24 (24.5)
Educational attainment	
Less than high school	40 (40.8)
At least high school	58 (59.2)
Country of origin	
Mexico	74 (75.5)
Other countries	24 (24.5)
Sexual orientation	
Gay	73 (75.3)
Bisexual	12 (12.4)
Relationship status	
Single, not dating anyone special	44 (44.9)
Dating someone special, partnered, or married but sex with others	20 (20.4)
Dating someone special, partnered, or married and no sex with others	34 (34.7)
General health status	2.5 \pm 1.0 (1–5)
Routine check-up	
Within the past year	67 (68.4)
More than one year	22 (22.4)
Never	9 (9.2)
Social support	55.3 \pm 17.4 (18–90)
Acculturation	24.6 \pm 7.2 (11–44)
Racial/ethnic discrimination	3.5 \pm 2.5 (0–10)
Sexual discrimination	2.5 \pm 2.6 (0–8)
Internalized homonegativity	36.2 \pm 9.2 (12–49)

Table 2

Fit Statistics for Latent Class Models Reflecting Profiles of Health Vulnerability

Number of Classes	Parameters	Log-likelihood	AIC ^a	BIC ^b	SSA–BIC ^c	<i>p</i> LMR Adjusted LRT ^d	Entropy
2	25	-3204.65	6459.30	6539.94	6460.76	0.004	0.92
3	35	-3170.77	6411.53	6524.43	6413.58	0.272	0.92
4	45	-3142.44	6374.89	6520.05	6377.51	0.536	0.94
5	55	-3123.17	6356.34	6533.76	6359.55	0.642	0.90
6	65	-3107.00	6344.01	6553.68	6347.80	0.790	0.91

Note. Bold indicates the selected model.

^a AIC = Akaike's Information Criterion.

^b BIC = Bayesian Information Criterion.

^c SSA–BIC = sample size-adjusted Bayesian Information Criteria.

^d *p* LMR Adjusted LRT = *p*-values for Lo–Mendell–Rubin adjusted likelihood ratio test for *K* versus *K* – 1 classes.

Table 3

Latent Class Prevalence and Estimated Means or Item-response Probabilities

Indicator	Class 1 (Low Education & High Social Support)	Class 2 (High Education & Year-round Employment)	Class 3 (High Education & High Discrimination)
	Class Size 118 (63.4%)	35 (18.8%)	33 (17.7%)
Socioeconomic Stability (probability)			
Education	0.43	0.60	0.59
Employment	0.78	0.79	0.57
Health Care Access (probability)			
Routine Check-up	0.64	0.52	0.61
Social Characteristics (mean)			
Social Support	57.61	51.74	54.47
Acculturation	22.95	23.94	24.70
Racial/Ethnic Discrimination	1.63	4.41	6.34
Sexual Discrimination	0.38	3.48	6.37
Internalized Homonegativity	35.94	37.56	36.75

Note. Bold indicates high indicator endorsements within each latent class compared to other classes.

We labeled Class 1 as Low Education and High Social Support because it contained Latinx sexual and gender minorities who were likely to report lower educational

attainment (estimated probability = 0.43) and higher average social support (\bar{x} = 57.61), compared to the other classes. Latinx in this class also differed in their higher probability

of routine check-ups (estimated probability = 0.64) and low perceived racial/ethnic and sexual discrimination (\bar{x} = 1.63 and 0.38, respectively). Class 2, High Education and Year-round Employment tended to endorse indicators of high educational attainment (estimated probability = 0.60) and year-round employment (estimated probability = 0.79). However, Latinx in this class also had a lower probability of routine check-ups (estimated probability = 0.52) and lower social support (\bar{x} = 51.74), in addition to higher internalized homonegativity (\bar{x} = 37.56), compared to the other classes. Finally, we labeled Class 3 as High Education and High Discrimination because it differed from the other two classes by its high indicator endorsement of both perceived racial/ethnic and sexual discrimination (\bar{x} = 6.34 and 6.37, respectively), compared to the other classes. Latinx in this class also provided indicator endorsements for similarly high levels of educational attainment (estimated probability = 0.59) as the High Education and Year-round Employment class (Class 2), though were less likely to be employed year-round (estimated probability = 0.57), compared to the other classes.

Discussion

To date, vulnerable populations research has been limited by overly broad definitions, lack of clear indicators, and failure to explore subgroups of vulnerability (Arora et al., 2015; Grabovschi et al., 2013; Shi & Stevens, 2005). The present analysis aimed to address these issues by operationalizing health vulnerability using select socioeconomic stability, health care access, and social characteristics indicators among a sample of Latinx sexual and gender minorities to identify vulnerable subgroups. Although our findings may be unique to our sample and the context in which they may experience health vulnerability, our theoretical and analytic

approach can be applied to operationalize and examine vulnerability for other multi-marginalized populations.

We identified three subgroups of vulnerability among our sample of Latinx sexual and gender minorities living in a new settlement state. The Low Education and High Social Support class was the largest among the three subgroups, comprising nearly two-thirds of participants. This class was characterized by both potential facilitators (i.e., indicator endorsement of routine check-ups and social support) and barriers (i.e., indicator endorsement of low educational attainment) to health promotion. Additionally, the High Education and Year-round Employment class was represented by important facilitators to health promotion (e.g., high educational attainment and year-round employment status), whereas the High Education and High Discrimination class included some critical barriers to health promotion (e.g., high perceived racial/ethnic and sexual discrimination and not employed year-round). Within the subgroups, these salient indicators may be critical contributors to vulnerability in our sample of Latinx sexual and gender minorities and suggest the heterogeneity in health vulnerability.

To operationalize health vulnerability using measurable indicator variables, we relied on existing literature on Latinx sexual and gender minorities, social determinants of health, and vulnerable populations theory (Derose et al., 2007; Dovidio et al., 2010; Rhodes et al., 2017; Tanner et al., 2014). Overall, this approach proved useful in latent class identification and suggesting salient indicators across vulnerable subgroups. Notably, indicator endorsement of the socioeconomic stability domain, an important predictor of health-promoting behaviors in general and a key construct in social determinants of health, varied distinctly by subgroup, thus grounded our naming conventions for each subgroup

(CDC, 2015; Harling et al., 2013). Instead of aligning the different subgroups of health vulnerability as gradations (e.g., highly or less vulnerable), which is the typical and most intuitive approach (Grabovschi et al., 2013), we desired to highlight the salient indicators as part of our naming conventions to more accurately portray the specific vulnerability aspects in each subgroup.

Our findings underscore the complexity of vulnerability. Although understanding vulnerability as gradations may be of some utility (Arora et al., 2015), our results suggest that vulnerability may be better characterized as *typologies* with varying dimensions of health vulnerability. This finding is in contrast to the dynamic multi-vulnerability model of health care disparities proposed by Grabovschi and colleagues (2013), wherein those who experience high vulnerability are characterized by multiple vulnerability aspects and those who experience low vulnerability experience fewer aspects, as represented by a right-angled triangle. The vulnerable subgroups we identified in our sample exhibited more qualitative differences than gradations of difference, which may be imagined represented by a Venn diagram with overlapping circles. The indicator endorsements within each class did not uniformly reflect characteristics of low or high health vulnerability; for example, Latinx in the High Education and Year-round Employment class endorsed these important facilitators, but also low routine check-ups and low social support. Thus, the heterogeneity in vulnerability may be more appropriately related to *how* subgroups are vulnerable, rather than *which* subgroup is more vulnerable. Vulnerable populations may include subgroups of people who are vulnerable in different ways (e.g., high discrimination or low educational attainment).

Implications for Health Behavior Theory

Identifying the different typologies of health vulnerability and their salient indicators—that is, understanding what types of vulnerability aspects characterize subgroups in the target population—yields important information that has potential implications for prevention programming and more focused interventions. First, it can help identify indicators that have been shown through research to support health (e.g., social support), in spite of (potentially) multiple vulnerability aspects (Carlos et al., 2010; Gilbert & Rhodes, 2013; Lauby et al., 2012; Lopez-Quintero et al., 2005; Solorio et al., 2013; Vega et al., 2010). Notably, all three typologies endorsed indicators of relatively high social support levels in our study. Harnessing social support through social network-based interventions (e.g., peer educators) can be considered in improving health behaviors for Latinx sexual and gender minorities and other vulnerable populations. Established efforts have used community lay health advisors (e.g., *Navegantes* and *Promotores*) to facilitate health promotion and risk prevention for Latinx, including Latinx sexual and gender minorities (Medina et al., 2007; Ramos et al., 2006; Rhodes et al., 2006). These interventions were developed in partnership with community members and relied on social networks to diffuse health education messaging (e.g., STI testing, mammography screening, and cardiovascular health behaviors) and build participants' capacity to engage in health promotion activities (Martinez et al., 2014; Medina et al., 2007; Ramos et al., 2006; Rhodes, Daniel, et al., 2013, 2014, 2017; Rhodes et al., 2009; Rhodes et al., 2016; Sun et al., 2014; Sun et al., 2015). Harnessing the existing strengths

that emerge from salient vulnerability indicators may enhance health-promoting behaviors among Latinx sexual and gender minorities and other vulnerable populations.

Second, interventions may be able to provide targeted efforts for differentially vulnerable subgroups—and thus those who may benefit the most from more focused health promotion and risk prevention programming. Although we do not suggest tailoring interventions solely to these vulnerable subgroups given the inherent needs of an already vulnerable population, interventions can potentially be tailored toward the broader targeted group (e.g., Latinx sexual and gender minorities) that include specific components that may address some of the unique needs of different subgroups. For example, an intervention that includes subgroups of Latinx sexual and gender minorities who experience high racial/ethnic and sexual discrimination may need additional intervention components that increase their awareness, trust, and comfort in accessing healthcare services, as well as increased provider training related to cultural sensitivity and awareness (Thornicroft et al., 2016). This subgroup could opt in to access information about their right to receive healthcare services and how providers are required to serve all patients, along with a tour of a local Latinx-friendly mental health organization facilitated by a lay health advisor. Other strategies to tailor intervention components to specific subgroups could include providing additional intervention activities (e.g., additional peer education lessons) or increasing the intensity of existing components (e.g., more text message reminders in a social media intervention) to address the needs of differentially vulnerable subgroups (Rhodes, Daniel, et al., 2013; Tanner et al., 2016).

Limitations

Several limitations within this study should be considered. Our small, geographically specific sample consisted of Latinx sexual and gender minorities who were willing to participate in the HOLA intervention (Rhodes et al., 2017); thus, findings are likely not generalizable to Latinx living in other parts of the United States, particularly in areas with established immigrant populations, or other subpopulations of Latinx (e.g., transgender men and other ethnic groups). Future studies with larger sample sizes are critical to adequately test the proposed health vulnerability model in the present analysis. Studies that examine how vulnerability changes over time (e.g., using latent transition analysis) can also expand our understanding of vulnerability for specific populations. The inclusion of structural-level indicators, as suggested in the General Model of Vulnerability (Shi, Stevens, Lebrun, et al., 2008), in future work is important to move toward testing a comprehensive model that includes multilevel vulnerability indicators (e.g., neighborhood poverty concentration, proximity to healthcare services, and anti-immigration sentiment) (Dang et al., 2012; Latkin & Knowlton, 2005; Loh, 2017). The inclusion of qualitative data as part of mixed-method studies of vulnerability can also expand our understanding of the complexity of vulnerability by illuminating how the dimensions of vulnerability are perceived, experienced, and labeled by the target populations themselves (Benmarhnia et al., 2018; Grabovschi et al., 2013).

Conclusion

Health vulnerability may be contextual and dynamic for different populations at dif-

-ferent points in time. What constitutes vulnerability for this sample of Latinx sexual and gender minorities in the southern United States may be different than what constitutes vulnerability for those living in other areas and other Latinx subpopulations at other times. Uncovering typologies of vulnerability affirms heterogeneity within the Latinx community in the United States, who are often considered and measured as a homogenous group. Using innovative methodological approaches to illuminate the ways in which Latinx are diverse—including in their health vulnerability—potentially allows for future intervention efforts to be tailored to specific subgroups of Latinx sexual and gender minorities, as well as other vulnerable populations living in various parts of the United States.

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