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Measuring Dimensions of HIV-related Stigma Among College Students

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Abstract

HIV-related stigma remains a critical barrier to achieving national public health objectives including reducing HIV transmissions and retaining people living with HIV (PLHIV) in care. Adolescents and emerging adults are particularly vulnerable to HIV-related stigma and HIV transmission and, thus, are a priority population with regard to reducing stigma and increasing healthcare engagement. In order to reduce stigma, a better understanding of the multidimensional nature of HIV-related stigma is needed. The *Stigmatizing Attitudes towards People Living with HIV/AIDS Scale* (SAT-PLWHA-S) is a measure of HIV-related stigma developed in Canada. The current investigation sought to assess the validity and dimensionality of a revised SAT-PLAWHA-S in young adults and in the United States. A revised SAT-PLWHA-S was completed by 2,686 college students in the southeastern United States. Confirmatory Factor Analysis indicated that the revised SAT-PLWHA-S measures a 6-factor structure consisting of: *concerns of occasional encounters*, *avoidance of personal contact*, *responsibility and blame*, *liberalism*, *non-discrimination*, and *social policy*. Overall, participants in our sample had low HIV-related stigma (M = 3.11; range 1–4, higher scores indicate less stigma). Scores demonstrated discriminant and concomitant validity with demographic characteristics, sexual behaviors, HIV testing history, and knowing PLHIV. We observed more stigmatizing attitudes regarding *social policy*, underscoring the need for public health practitioners and researchers to reduce HIV-related stigma related to criminalization and disclosure policies.

Keywords: HIV stigma; HIV prevention; psychometric; measurement; young adults

Measuring Dimensions of HIV-related Stigma Among College Students

There are an estimated 1.1 million people living with HIV (PLHIV) in the United States (Centers for Disease Control and Prevention [CDC], 2019). While national estimates indicate 1 in 7 (~14%) PLHIV overall are not aware of their HIV status, contributing to the continued spread of the disease, among youth and young adult PLHIV (ages 13-24), 44% are not aware of their HIV status (CDC, 2019). Research has shown that low HIV testing engagement is associated with anticipated HIV-related stigma (Gamarel et al., 2018; Golub & Gamarel, 2013; Okumu et al., 2017). HIV-related stigma also impacts HIV treatment by reducing medication adherence (Fields et al., 2017; Katz et al., 2013).

HIV-related stigma is conceptualized as beliefs about PLHIV (or those perceived to be PLHIV) that can manifest in several discriminatory ways, including stereotypes, social isolation, and enacted hostility (Golub & Gamarel, 2013; Herek et al., 2002; Katz et al., 2013). HIV-related stigma exacerbates the physical and mental health of PLHIV and remains a considerable barrier to HIV prevention and treatment (Golub & Gamarel, 2013; Katz et al., 2013). The CDC (2019) reports that in 2016, among all PLHIV, only 74.2% received some medical care and 61.5% had achieved viral suppression. When compared to any other age group, fewer youth and young adults living with HIV received timely linkage to medical care after diagnosis and, similarly, fewer were retained in care and achieved viral suppression (National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention, 2019). HIV-related health outcomes, including linkage and retention, are well established to be associated with experiencing external and internalized stigma (Holtzman et al., 2015; Turan et al., 2017). Thus, HIV-related stigma presents a considerable barrier to national health promotion efforts, such as “Undetectable = Untransmittable,” which promotes treatment adherence can reduce viral load below a detectable

amount consequently preventing transmission (National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention, 2018). Therefore, understanding and addressing HIV-related stigma among youth and young adults is an important step towards increasing testing engagement, treatment engagement, and decreasing stigmatizing and discriminatory actions towards PLHIV.

Central to understanding HIV-related stigma is appropriately measuring stigma. Although HIV-related stigma has affected HIV prevention and treatment efforts for as long as HIV has been around, measures of HIV-related stigma still lack consistent conceptualizations of the mechanisms and domains of stigma. This contributes to significant limitations in the validity and reliability of stigma measurements, which in turn undermines these instruments' utility and generalizability (Earnshaw & Chaudoir, 2009; Mahajan et al., 2008). In 2009, Earnshaw and Chaudoir (2009) introduced the HIV Stigma Framework to provide a cohesive perspective to better understand HIV stigma and its impact of on both PLHIV and those not living with HIV. This framework underscores the role of social context by describing how various forms of HIV stigma are experienced and impact PLHIV. That is, stigma enacted by HIV negative individuals leads to social distancing and support of discriminatory policies which leads to enacted, internalized, or anticipated stigma towards PLHIV, associated with poorer mental, physical and social health outcomes (Earnshaw & Chaudoir, 2009). Thus, the role of social and structural context is of critical importance when measuring HIV-related stigma.

There are several survey instruments measuring HIV-related stigma: in 2009, there were 23 instruments across over 10 countries (Earnshaw & Chaudoir, 2009). These scales are typically segmented by the serostatus of the population of its intended use. For example, the Berger HIV Stigma Scale (Berger et al., 2001) is a commonly used 40-item measure characterizing stigma from the perspective of PLHIV through constructs of personalized stigma, concerns regarding

disclosure, negative self-image, and concerns of public attitudes towards PLHIV. When considering HIV-related stigma among people who are not living with HIV, Earnshaw and Chaudoir (2009) identified that HIV-related prejudice and discrimination were strongly measured and understood in HIV stigma research but there was a lack of instruments measuring HIV-related stereotyping. Stereotyping is important to understand the socio-structural relations between prejudice and discrimination, and stigma enacted, anticipated or internalized by PLHIV (Mahajan et al., 2008; Parker & Aggleton, 2003). Further, stereotyping is likely associated with antecedents of HIV preventive behavior, such as perceived susceptibility to HIV infection (Earnshaw et al., 2012; Earnshaw & Chaudoir, 2009); for example, a person who believes only men who have sex with men can be infected with HIV may have lower perceived susceptibility and lower HIV testing uptake. Therefore, stereotyping measures must be included to adequately measure HIV-related stigma.

The *Stigmatizing Attitudes Towards People Living with HIV/AIDS Scale* (SAT-PLWHA-S) is one of many instruments designed to measure mechanisms of HIV-related stigma among HIV negative persons (Beaulieu et al., 2014). The SAT-PLWHA-S was developed using data from 1,387 participants in Quebec, Canada. Beaulieu and colleagues started with an initial pool of 42 items in developing the SAT-PLWHA-S. Through exploratory factor analysis (EFA), items with low factor loadings were removed, thereby reducing the scale to 27-items distributed across seven factors. Later confirmed in confirmatory factor analysis (CFA), the seven factors were: concerns about occasional encounters, avoidance of personal contact, responsibility and blame, liberalism, non-discrimination, confidentiality of serological status, and criminalization of HIV transmission. These factors aligned with the HIV stigma constructs identified by Earnshaw and Chaudior (2009): stereotypes, prejudices, and discriminatory behavior. Because of the coverage

of these domains, this measure was selected for use in the current study. The measurement model was invariant across French and English speakers in Canada, with exception for the criminalization sub-scale – where more English speakers expressed favoring criminalization of HIV transmission. Results also showed moderate to high internal consistency reliability (0.59 – 0.79), and an overall alpha of 0.88, indicating the scores were reliable. The scores also demonstrated an acceptable discriminant, criterion, and concomitant validity.

As noted in the original publication, authors of the scale intended for this measure to be used for population-level HIV-stigma surveillance, and as a suitable measure to assess the effectiveness of HIV awareness campaigns (Beaulieu et al., 2014). However, as Beaulieu and colleagues (2014) note, one study cannot provide sufficient evidence of validity for widespread use, especially given that reliability and validity are sample – and thus, context – dependent. Further, the field lacks continued psychometric studies focused on HIV stigma instruments and their use in new settings and populations (Mahajan et al. 2008). There is thus a clear need for additional evidence of validity of scores elicited from the SAT-PLWHA-S prior to its implementation in other contexts for the proposed uses of the scale. Given this need, we conducted a validity study of the internal structure and concomitant associations of a revised SAT-PLWHA-S. Specifically, we assessed the dimensionality of the scale through exploratory and confirmatory factor analyses (EFA and CFA, respectively), and internal consistency reliability using data from the seven factors outlined by Beaulieu and colleagues (2014). Then, in order to examine if the scale could distinguish between demographic and behavioral sub-groups, we assessed convergent validity.

Methods

Procedure and Sample

Procedures for this study were reviewed and approved by the University of Florida Institutional Review Board. We obtained a simple random sample (without replacement) of 10,000 undergraduate and graduate degree-seeking university students over age 18 who attended courses on the main campus of a large public university in Florida; the sample was provided by the University Registrar's Office. Prospective participants were invited via emails in January 2016 to participate in research on sexual behavior, HIV-related knowledge, and attitudes related to HIV and HIV testing. E-mails contained information about the purpose of the study (i.e., to assess HIV-related attitudes and knowledge), the minimal risks (e.g., potential breach of confidentiality being minimized because the survey was anonymous) and indirect benefit of participating (i.e., improving public health understanding of HIV prevention among college students). In addition, we offered a $20 Amazon® gift card incentive to the first, middle, and last 10 participants to complete the 94-item survey. This incentive strategy was recommended to the authors by health promotion practitioners and survey researchers who had experience administering surveys on campus, but we adjusted the recommended dollar amounts ($50) to $20, due to limited study resources. Three reminder e-mails were also sent out over the two weeks of data collection (ending in February 2016). In total, the Qualtrics survey link was opened by 3,162 participants, and 2,343 completed all survey questions.

Measures

HIV-related stigma. As mentioned above, HIV-related stigma was measured using the SAT-PLWHA-S. This scale was developed to measure attitudes regarding mechanisms of HIV-related stigma enacted towards PLHIV (i.e., stereotypes, prejudices, discriminatory attitudes, and social distancing) through a 4-point Likert-type response scale. Our administration of the SAT-PLWHA-S included several revisions to both the method of implementation and wording of the

scale, which further underscores the need to evaluate the underlying dimensionality and assess convergent validity to verify score generalizability across heterogeneous populations, settings, and times. Changes in administration format included language (only offered in English), target sample (to college students), and location (the United States). Item revisions made prior to data collection were based on feedback elicited from an expert panel (i.e., a PhD-level Certified Health Education Specialist with 25-years in college health promotion evaluation and psychometrics, a Certified Health Education Specialist with 10-years of managing college HIV prevention programs, and a self-identifying gay undergraduate student). Based on the panel's feedback, we changed all terminology of "AIDS virus" and "AIDS" on the scale to read as "HIV." This change was recommended because AIDS is not synonymous with HIV infection; AIDS – or Stage 3 HIV infection – is a medical condition characterized by a compromised CD4 count and/or a specific opportunistic condition. Secondly, we removed an item from the original *Criminalization of transmission* sub-scale (i.e., "Transmitting the AIDS virus is a crime."). In Florida, transmitting HIV is in fact a crime; our expert reviewers felt strongly that this wording would cause participant confusion because it could be interpreted as a knowledge item.

External variables. Although this dimensionality study is focused on the revised SAT-PLWHA-S, we measured a number of external variables that were hypothesized to be associated with scale scores to assess the validity of the scale. Specifically, this included HIV-related knowledge and demographic characteristics. HIV-related knowledge was measured through the 18-item HIV Knowledge Questionnaire Short Form (Carey & Schroder, 2002), with an additional 5-items from the longer version (Carey et al., 1997). Scores from the knowledge scale had acceptable internal consistency reliability in our sample ($\alpha = 0.79$) (James, Cheong, Ryan, 2019; James & Ryan, 2018). Demographic items measured include sexual orientation,

race/ethnicity, gender identity, age, and social/behavioral items were knowing a PLHIV, ever being tested for HIV, and being sexually active.

Data Analysis

Our analytic sample consisted of 2,686 participants who answered all of the stigma items; missing data analysis indicated that the excluded respondents did not differ from our analytic sample's characteristics except that a larger proportion of undergraduates (10% more) were present in the analytic sample. Given the number of changes made to the stigma scale's item wording and, importantly, administration modality, it is possible that the factor structure changed between Beaulieu and colleague's (2014) original paper and the current study. For example, social desirability bias introduced through telephone interview administration modalities that were used in the original study may affect responses and, therefore, model results (Navarro-González et al., 2016; Kreuter et al., 2008). To test if the factor structure changed, we chose to first implement EFA procedures to identify a candidate model (which may be different than that of the original SAT-PLWHA-S), and then test the model empirically using CFA.

We randomly selected 50% of the cases to use in the EFA; the remainder were used in CFA. To explore the dimensionality of the revised SAT-PLWHA-S in our sample, we used principal axis factoring (PAF) in EFA framework with oblimin (oblique) rotation. This strategy is identical to the method employed by Beaulieu and colleagues (2014) and is appropriate for the data given the correlations between factors of the original scale. During our EFA procedure, items with low factor loadings (< 0.30) were excluded from the final solution. To further confirm the factor structure observed in EFA, we conducted CFA using M*plus* (Muthén & Muthén, 1998-2017), where the latent variables were specified with the indicators that showed highest loadings on each factor in EFA. As the items were measured on a 4-point scale, we used the weighted

least squares estimator (i.e., WLSMV) appropriate for ordinal data. Our model included correlations between common factors. We assessed model fit using the chi-square test, Comparative Fit Index (CFI), Tucker Lewis Index (TLI), and root mean square error approximation (RMSEA). Optimal model fit is indicated by non-significant chi-square test, CFI and TLI estimates approaching 1.0, and RMSEA less than 0.8 (Hu & Bentler, 1999; Schumacker & Lomax, 2015).

Finally, using the structure of the best fit CFA model, we calculated the means of item responses to obtain each factor score and total score. We also used Classical Test Theory measurements of item difficulty, item discrimination, and internal consistency reliability to assess the internal structure validity of the scores (Crocker & Algina, 1986). Item difficulty is an average of the item score across respondents; in our case, higher item difficulties indicate more positive attitudes towards PLHIV (i.e., lower HIV-related stigma). Item discriminations were calculated using corrected item-total correlations, the correlations between each item score and the total score of the remainder of the items; higher correlations are preferred, as they indicate the item response is highly correlated with the total score of the individual factor. Internal consistency reliability was calculated using Cronbach's alpha; values larger than 0.70 are preferred, however shorter scales may not have large values of α (Cortina, 1993). Finally, we estimated effect size differences between the total and individual factor scores and external variables including HIV-related knowledge and demographic groups. For continuous variables, we used Pearson's *r* correlations; for group means, Cohen's *d*.

Results

Sample Characteristics

Consistent with the institution's demographic profile, our sample had a mean age of 21.86 years (*SD* = 4.19; range: 18 – 58), was predominately white (71.5%), female (62.1%), and undergraduate (72.0%). Less than one-fifth (12.1%) were sexual minorities (i.e., lesbian, gay, bisexual, queer, questioning, asexual, etc.). A majority (72.5%) were sexually active – having engaged in oral, anal, or vaginal intercourse in the 12 months prior to the survey; yet, only 33.9% had ever received an HIV test. HIV-related knowledge scores ranged from 0.0% to 100.0% correct, with a mean of 77.4% (*SD* = 16.0%). One-tenth (10.0%) of respondents reported knowing a PLHIV.

Internal Structure

We ran a series of EFAs using Principal Axis Factoring with oblimin rotation with the entire available item-set; estimates of KMO and Bartlett's test indicated the data were suitable for EFA (KMO = 0.93, Bartlett's test $p < 0.001$). The initial extraction indicated a 5-factor solution (based on Eigenvalues > 1.00): these 5-factors explained 60.27% of the variance and estimated correlations between factors were low to moderate (0.17 to 0.70). However, the 6th factor had an Eigenvalue of 0.984 and would explain an additional 3.78% of the variance. Thus, we also ran a 6-factor structure; the range of correlations (0.149 to 0.653) was slightly smaller than those in the 5-factor solution (0.173 to 0.696).

In CFA models, model fit of the revised 5- [RMSEA = 0.064 (90% CI: 0.061 to 0.067); CFI = 0.957; TLI = 0.951] and 6-factor [RMSEA = 0.068 (90% CI: 0.065 to 0.071); CFI = 0.952; TLI = 0.957] solutions were acceptable. Because comparative model fit indices are not estimated under WSLMV, we used robust maximum likelihood estimation to assess BIC and AIC; results indicated that the revised 6-factor solution was more parsimonious than 5-factors (BIC [6] = 57591.96 vs. BIC [5] = 57826.52). Thus, we proceeded with the 6-factor solution.

Of the 6-factors estimated, 3 remained stable between Beaulieu and colleague's (2014) original structure and the current revision (see Table 1): *Avoidance of personal contact* (F2), *Responsibility and blame* (F3), and *Liberalism* (F4). Factor 1 and Factor 5 aligned with the original *Concerns of occasional encounters* (F1) and *Non-discrimination* (F5) with the exception that an item moved from F5 to F1 (i.e., "If I had a roommate and discovered they were infected with HIV, it would not bother me."). F6 (*Social policy*) emerged as a combination of *Confidentiality of serological status* (3 items) and *Criminalization of transmission* (2 items) sub-scales from the original SAT-PLWHA-S, with the removal of 2 items from the original Criminalization sub-scale and 1 item from the Confidentiality sub-scale.

Table 1 about here

Using the 6-factor structure, we estimated item difficulties (i.e., means), item discriminations (i.e., corrected item-total correlations), and internal consistency reliability of each of the unidimensional sub-scales (see Table 2). Item difficulties ranged from 2.24 to 3.60 (true possible range: 1.00 to 4.00; higher scores indicating lower stigma), indicating varying levels of HIV-related stigma as measured by the items in this scale. F3 (*Responsibility and blame, M = 3.46*) had the highest item difficulties, indicating relatively lower HIV-related stigma related to believing the PLHIV was responsible and should be blamed for their condition; F6 had the lowest item difficulties indicating that, on average, college students in our sample had more stigmatizing attitudes from the social policy perspective. Item discriminations of each sub-scale were very acceptable, with the lower bound of discrimination being over recommended cutoffs of 0.30 (Pallant, 2013). Item discriminations for the entire scale were less acceptable, with a

range of 0.149 to 0.617, which is likely due to the multidimensionality of the total scale. Lower discriminations and differences in response patterns for items from F6 also likely contributed to this (i.e., participants reported being less stigmatizing for factors between F1 and F5, but expressed more stigmatizing attitudes in F6). Responses to the revised SAT-PLWHA-S as a whole had very high internal consistency ($\alpha = 0.905$). Four of the six sub-scales had $\alpha \geq 0.800$, one had a marginally acceptable $\alpha = 0.761$, and F6 had $\alpha = 0.650$.

Table 2 about here

Relations to Other Variables

The average total score on the revised SAT-PLWHA-S was 3.11 (*SD* = 0.45; true range: 1.00 to 4.00, higher scores indicating lower stigma) indicating that our sample had relatively low HIV-related stigma. Overall, total and individual factor scores displayed sufficient evidence of being associated with demographic and behavioral variables (see Table 3). Total stigma scores were moderately, positively correlated with HIV-related knowledge ($r = 0.31$); when considering sub-scale scores, Pearson's *r* correlations ranged from zero to moderate ($r = 0.28$). Among demographic sub-groups, the largest effect sizes ($d = 0.17$ to 0.72) were observed among the sexual orientation groups, with sexual minorities (i.e., LGB+) having less stigma compared to their heterosexual counterparts, and knowing a PLHIV had the second-largest effect sizes ($d = 0.07$ to 0.41). F6 had some of the lowest effect sizes ($d = 0.07$ to 0.29); on average, across sub-groups, participants demonstrated more HIV-related stigma related to social policy.

Table 3 about here

Discussion

Adolescents and young adults are priority population for HIV testing and treatment efforts; however, HIV-related stigma remains a considerable barrier to engaging this population in public health efforts. Conducting HIV-related stigma surveillance and developing interventions based on those findings is crucial to meeting national public health objectives. Therefore, scales that assess the multidimensional nature of HIV-related stigma, with evidence of validity and reliability across different contexts and populations, are needed. To this end, we examined the dimensionality of a revised *Stigmatizing Attitudes Towards Persons Living with HIV/AIDS Scale* (SAT-PLWHA-S) administered to college students in the United States.

With the removal of one item from the original scaled developed by Beaulieu and colleagues (2014), based on expert panel review – given the different laws that govern criminalization of HIV transmission in Canada and Florida, U.S.A – our data most appropriately fit a 6-factor model, including three factors from the original structure, i.e., F2 (Avoidance of personal contact), F3 (Responsibility and blame), and F4 (Liberalism) .

Two factors – F1 (*Concerns of occasional encounters*) and F5 (*Non-discrimination*) – remained similar to the original study, with one item ("If I had a roommate and discovered they were infected with HIV, it would not bother me") moving from F5 to F1. This structural change is both empirically and theoretically supported. Beaulieu and colleagues (2014) initially mapped this item, and all items on F1, as related to the stigma mechanism of affect-based prejudices; although, they moved this item to the original F5 focusing on its implication for discriminatory actions. Further, F1 includes items representing personal relationship statements, while F5 focuses on general relationships. Our EFA suggested the appropriateness of this *a priori*

conceptualization (by the original authors) for this item to load on F1, which was confirmed empirically in our CFA.

F6 (*Social policy*) is a new factor that combined items from the original *Confidentiality of serological status* (1 item) and *Criminalization of transmission* (2 items) sub-scales. The three items that loaded on this factor were related to mandatory reporting of PLHIV's names to the government, beliefs related to the need to punish the transmission of HIV by law, and perceptions of criminality of transmitting HIV. This factor is supported by the original conceptualization of the scale: items from the *Confidentiality* and *Criminalization* factor were developed to measure discriminatory actions (Beaulieu et al., 2014). Importantly, items within this factor have lower item discriminations compared to items in F1-F5; indicating that these items are less related to the constructs measured by items in other factors. This is further empirically supported by item difficulties: the lowest item difficulties are observed in F6, indicating that participants have more stigmatizing beliefs regarding HIV-related social policy.

With respect to relations between the revised SAT-PLWHA-S scores and other variables, our results align closely with the original study with women and people knowing a PLHIV having less stigma. In addition, sexual minorities (i.e., LGB+) had less stigma than heterosexual individuals across all factors, with the highest effect size difference (d = 0.72) observed for F4 (*Liberalism*) and the total score. This is consistent with the original study, which found that individuals who displayed more homophobia had more HIV-related stigma (Beaulieu et al., 2014). Higher HIV-related stigma was also observed among people of color, men, individuals who have never been tested for HIV, and those who were not sexually active. Importantly, F6 had the lowest effect size differences and the lowest total score (2.68) indicating that, across sub-groups, college students in our sample had more HIV-related stigma related to social policy.

The results of this dimensionality study are subject to several limitations. First, we intentionally excluded an item from the original *Criminalization of transmission* scale and revised item wording. Although these revisions were highly recommended by experts and the majority of factors replicated, it may have inadvertently affected the scale structure. Due to the item's exclusion, we are unable to compare the model fit with and without the presence of this item. Similarly, we changed all instances of "AIDS virus" and "AIDS" to read as "HIV;" this change may reduce construct coverage of the scale, as there is a lack of specification of "HIV" or "AIDS." Alternatively, this could be seen as increasing specificity for measuring stigma related to HIV, not AIDS. The current study included college students sampled from one institution; as our psychometric methods (e.g., EFA, CFA, item difficulty and discrimination, and internal consistency reliability) are grounded in Classical Test Theory, and therefore sample dependent (Embretson & Reise, 2000; Crocker & Algina, 1986), the generalizability of the revised structure should be tested in future studies. Future studies should sample from diverse geographic locations to decrease potential sampling bias, and also test hypotheses related to the geographic distribution of HIV-related stigma. Lastly, the response data and external variables were collected using a cross-sectional survey; thus, we cannot make causal claims with respect to the relations between stigma scores, demographic and behavioral variables.

Implications for Future Research and Practice

Despite noted limitations, our study adds evidence on reliable constructs capturing aspects of HIV-related stigma. Additional research is needed to further refine stigma scales that elicit reliable and valid responses across different contexts. With the understanding of the need to address our limitations, the field requires additional validity and dimensionality studies of scores collected by this scale including item response theory, which could help identify the potential of

using computer adaptive testing – allowing researchers to reduce the number of items measured, while eliciting reliable scores. Another potential focus for future research is regarding the validity of answers elicited by the stigma scale based on the administration modality. Beaulieu and colleagues (2014) originally administered this scale via telephone interview, whereas we used an online survey. The use of an online survey may have reduced social desirability bias while eliciting more honest answers regarding sensitive topics (Kreuter et al., 2008), including HIV-related stigma. These findings can also be applied to a variety of methods in health promotion practice, particularly for tailoring communication messages for HIV awareness and stigma reduction campaigns. Our findings indicate that college students have relatively more positive beliefs regarding concerns of occasional encounters and not assigning responsibility or blame, but more HIV stigma related to social policy. HIV criminalization policies and internalized HIV-related stigma is associated with increased psychological distress and lower health-related quality of life (Breslow & Brewster, 2019). Therefore, health communication professionals should consider addressing social policy-related stigma which can include education and awareness of the effects of confidentiality and criminalization polices.

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Table 1. Item standardized factor loadings from the revised 6-solution confirmatory factor analysis.

Item number and content by factor	**Factor loading**	**Error variance**
Factor 1: ***Concerns of occasional encounters***		
Being around someone who has HIV does not bother me.	0.896 (0.009)	0.198
I would not be worried for my health if a co-worker had HIV.	0.813 (0.012)	0.339
It would not bother me if there was a boarding house for people with HIV on my street.	0.729 (0.015)	0.469
If I had a roommate and discovered they were infected with HIV, it would not bother me.	0.862 (0.009)	0.258
Factor 2: ***Avoidance of personal contact***[a]		
I could not be friends with someone who has HIV.	0.741 (0.017)	0.451
I would limit my contact with a person who I know has HIV.	0.838 (0.013)	0.297
I would not hug someone with HIV.	0.852 (0.012)	0.274
Factor 3: ***Responsibility and blame***[a]		
People who use injectable drugs deserve to have HIV.	0.810 (0.016)	0.343
My support for a person living with HIV depends on how the person was infected.	0.780 (0.016)	0.392
I am disgusted by persons who were infected with HIV during homosexual relations.	0.895 (0.015)	0.200
People who are infected with HIV because they have not used a condom deserve what they get.	0.826 (0.015)	0.317
People with HIV have only themselves to blame.	0.776 (0.018)	0.398
Most people with HIV are responsible for having their illness.	0.716 (0.018)	0.487
Factor 4: ***Liberalism***[a]		
To fight HIV, it is necessary that young people not have sex.	0.768 (0.017)	0.410
Reinforcement of traditional sexual values will help to control the spread of HIV.	0.828 (0.014)	0.315
The arrival of HIV is linked to the fact that people have more sexual freedom.	0.783 (0.015)	0.386
The spread of HIV is linked to the decline of moral values.	0.928 (0.011)	0.139
Factor 5: ***Non-discrimination***		

People who have HIV should have the right to work serving the public, as waiters-waitresses, cooks, hairdressers.	0.854 (0.012)	0.270
Children with HIV should be able to go to day-care.	0.833 (0.013)	0.306
Doctors with HIV should be allowed to go on working with their patients.	0.820 (0.012)	0.328
People with HIV should be allowed to immigrate to United States.	0.842 (0.012)	0.291
Factor 6: *Social policy*[b]		
Doctors should report the names of people with HIV to the government.	0.883 (0.041)	0.219
Transmitting HIV should be punishable by law.	0.672 (0.028)	0.549
People who know they are infected with HIV and who transmit the virus are criminals.	0.487 (0.028)	0.763

[a]Stable factor between Beaulieu et al. (2014) and the current study.
[b]This factor includes 2-items from the original *Criminalization* sub-scale and 1-item from the *Confidentiality* sub-scale.

Table 2. Internal structure of factors in the revised solution.

Factor	Number of Items	Item Difficulty, Range	Item Discrimination, Range	α
Factor 1: Concerns of occasional encounters	4	2.73 – 3.03	0.626 - 0.749	0.855
Factor 2: Avoidance of personal contact	3	2.98 – 3.48	0.540 – 0.652	0.761
Factor 3: Responsibility and blame	6	3.22 – 3.60	0.589 – 0.702	0.849
Factor 4: Liberalism	4	2.81 – 3.21	0.628 – 0.758	0.855
Factor 5: Non-discrimination	4	2.90 – 3.15	0.655 – 0.717	0.852
Factor 6: Social policy	3	2.24 – 3.04	0.315 – 0.593	0.653
Overall	24	2.24 – 3.60	0.149 – 0.617	0.905

Note. True possible range of item difficulty is 1.00 to 4.00; higher values indicate more positive attitudes (i.e., less stigma).

Table 3. Revised solution SAT-PLWHA-S score relations with other variables.

Characteristic	n	Total		Factor 1		Factor 2		Factor 3		Factor 4		Factor 5		Factor 6	
		M	ES	*M*	ES	*M*	ES	*M*	ES	*M*	ES	*M*	ES	*M*	ES
Total	2686	3.11		2.90		3.28		3.46		3.03		3.06		2.68	
Age	2499		0.05 *		0.07 *		0.07 *		0.04 *		0.03		0.05 *		-0.09 *
Knowledge	2685		0.31 *		0.25 *		0.28 *		0.25 *		0.24 *		0.25 *		0.00
Race/ethnicity			0.24 *		0.11 *		0.16 *		0.23 *		0.28 *		0.03		0.17 *
White	1896	3.14		2.93		3.31		3.50		3.09		3.07		2.72	
Non-white	754	3.04		2.85		3.21		3.38		2.89		3.05		2.60	
Gender			0.25 *		0.03		0.16 *		0.35 *		0.16 *		0.05		0.29 *
Female	1664	3.15		2.91		3.32		3.53		3.08		3.08		2.76	
Not-female	1014	3.04		2.89		3.22		3.35		2.96		3.04		2.56	
Sexual orientation			0.71 *		0.59 *		0.44 *		0.45 *		0.72 *		0.54 *		0.17 *
LGB+	324	3.38		3.26		3.52		3.65		3.45		3.37		2.79	
Straight	2354	3.07		2.86		3.25		3.43		2.97		3.02		2.67	
Know PLHIV[a]			0.35 *		0.40 *		0.41 *		0.23 *		0.15 *		0.32 *		0.07
Yes	269	3.25		3.15		3.50		3.57		3.13		3.25		2.64	
No or Prefer not to say	2413	3.10		2.88		3.26		3.45		3.02		3.04		2.69	
HIV testing history, ever			0.29 *		0.23 *		0.24 *		0.28 *		0.29 *		0.21 *		0.09 *
Yes	908	3.20		3.01		3.38		3.55		3.17		3.16		2.65	

No	1773	3.07		2.85		3.23		3.41		2.96		3.02		2.70	
Sexually active			0.21 *		0.08		0.13 *		0.22 *		0.43 *		0.01		0.07
Yes	1938	3.14		2.92		3.30		3.49		3.12		3.06		2.67	
No	734	3.04		2.87		3.22		3.38		2.80		3.07		2.72	

* indicates $p < 0.05$.

Note. ES indicates standardized effect size. When comparing group means we use Cohen's *d*; continuous correlations, Pearson's *r*.

[a]PLHIV = Person Living with HIV