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The role of emotions in the reduction of HIV/AIDS stigma among physicians in training

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Abstract

Scientific literature has systematically documented the negative effects of social stigma for people living with HIV/AIDS (PLWHA). HIV/AIDS stigma has the potential to negatively impact self-care strategies for those already affected, and simultaneously hinder prevention efforts to deter the emergence of new infections. When health professionals manifest these negative attitudes access to quality health-care and prevention strategies can be seriously affected. Scientifically tested interventions to reduce HIV/AIDS stigma among health professionals are still scarce. Although the number of tested interventions has increased over the past decade, few of them target Latino health professionals or Spanish-speaking populations. Furthermore, although some of those interventions have been reported as effective for stigma reduction, more work is needed to better understand the underlying variables that account for the reduction of stigma attitudes in those efforts. The SPACES intervention has been documented as an effective HIV/AIDS stigma-reduction intervention focusing on health-care professionals in training. The intervention, which is delivered in Spanish, has been previously tested with medical students in Puerto Rico and shown significant results in addressing negative attitudes toward PLWHA. The main objective of this study was to document the underlying variables that fostered reduction of HIV/AIDS stigma due to participation in the SPACES intervention. Results evidence that health professionals in training who participated in the intervention ($n = 507$) had less stigmatizing attitudes toward PLWHA due to an increase in their positive emotions toward this population. In light of these results, we discuss the importance of engaging health professionals in HIV/AIDS stigma-reduction interventions that go beyond the provision of information and skills for interacting with PLWHA, and address the emotional component of HIV/AIDS stigma.

Keywords

Emotions; HIV/AIDS; stigma; reduction; health professionals

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Introduction

Social stigmatization continues to be a problem for many individuals affected by illness. Health conditions have social meanings that generate negative portrayals of individuals in their communities. Research continues to document how the stigmatization of individuals affected by disease is a persistent problem. Goffman's (1963) influential conceptualization of stigma as a profoundly negative attribute that aims to deprive individuals from their dignity and humanity still applies to many health conditions. HIV/AIDS in particular continues to carry negative value judgments, reflected in the coining of the term "AIDS-related stigma" or "HIV/AIDS stigma" which describes negative social meanings ascribed to individuals living with the disease regardless of the accuracy of that perception (Herek, 1999).

HIV/AIDS stigma literature shows that social scientists have contributed to a better understanding of its consequences for persons living with HIV/AIDS (PLWHA) (Famoroti, Fernandes, & Chima, 2013; Grossman & Stangl, 2013). For example, research documents how stigma can negatively influence the mental health of PLWHA, leading to depression, low self-esteem, and anxiety, among other effects (Li, Wang, Williams, & He, 2009; Rahmati-Najarkolaei et al., 2010; Whetten, Reif, Whetten, & Murphy-Mcmillan, 2008). Furthermore, HIV/AIDS stigma can also negatively affect physical health as it can limit access and adherence to antiretroviral treatment, which in turn accelerates disease progression and increases the risk of HIV transmission (Earnshaw, Smith, Chaudoir, Amico, & Copenhaver, 2013; Sayles, Wong, Kinsler, Martins, & Cunningham, 2009).

HIV/AIDS stigma can be even more profound when health professionals manifest such attitudes. HIV/AIDS stigma among health professionals is common and can be a barrier to effective access to treatment (Ekstrand, Ramakrishna, Bharat, & Heylen, 2013; Varas-Díaz, Malavé-Rivera, & Cintrón-Bou, 2008; Varas-Díaz & Neilands, 2009; Varas-Díaz, Neilands, Malavé-Rivera, & Betancourt, 2010). Although research has been nimble to respond in developing strategies to document HIV/AIDS stigma among health professionals, the development of effective interventions to reduce it has lagged behind. Still, strides have been made in developing and testing HIV/AIDS stigma-reducing interventions.

Interventions to reduce HIV/AIDS stigma

The development of effective and systematically tested interventions to reduce HIV/AIDS stigma is still an urgent priority. Brown, Macintyre, and Trujillo (2003) published a meta-analysis on such interventions and documented significant limitations, including: (1) the use of small samples, (2) lack of reliable and valid scales to assess HIV/AIDS stigma, (3) scarce evidence of sustained intervention impact, and (4) few efforts targeting health professionals. These findings were influential in guiding future efforts on HIV/AIDS stigma reduction in the following decade.

More than a decade later, Stangl, Lloyd, Brady, Holland, and Baral (2013) carried out a review of interventions to reduce HIV/AIDS stigma that revealed important gaps among existing strategies. These included: (1) the need for more rigorous research designs that can better explain how HIV/AIDS stigma is reduced and (2) lack of standardized stigma

measurement to systematically assess the effects of HIV/AIDS stigma-reduction interventions. A review of their findings demonstrates that interventions targeting health-care workers are still needed, even though these have significantly increased. Important strides have been made with regard to testing HIV/AIDS stigma-reduction interventions with health professionals throughout the world (e.g., Li, Lin, Guan, & Wu, 2013; Mak, Cheng, Law, Cheng, & Chan, 2015; Wu et al., 2008; Yiu, Mak, Ho, & Chui, 2010). Unfortunately, the number of interventions targeting Latinos and other Spanish-speaking sectors of the health-related workforce continues to be scarce. Despite the strides made, there are still many gaps to address in order to have effective HIV/AIDS stigma-reduction efforts for health professionals in general, and Latinos in particular.

The SPACES intervention

We developed an intervention to reduce negative attitudes toward PLWHA among health professionals in training (Varas-Díaz et al., 2013). We named our intervention SPACES consistent with our promotional tagline of fostering “stigma free spaces in medical scenarios”. The intervention is a nine-hour workshop divided into three sessions. The intervention addresses the sources and functions of HIV stigma based on Goffman’s (1963) theoretical contributions, issues that can worsen its consequences based on Jones et al.’s (1984) stigma dimensions, and focuses on both instrumental and symbolic stigmas in the context of HIV/AIDS. The intervention is informed by Social Cognitive Theory (Bandura, 1999) as an underlying conceptualization of attitude and behavior change which takes into account both individual (i.e., cognitive, affective) and contextual factors (i.e., social norms, evaluation from others) that can shape behavioral outcomes. Following this theory, the intervention aims to accelerate acquisition of correct information about HIV/AIDS, foster a critical examination of the role of emotions on social stigma, model non-stigmatizing skills for interacting with PLWHA, and increase awareness of how the social context enables stigmatization. The intervention is delivered via small groups to enhance opportunities for modeling new attitudes and behaviors, while simultaneously enhancing self-efficacy to provide stigma-free health services.

The first session provides information on HIV/AIDS stigma and its consequences on service delivery. In it we address participants’ knowledge of HIV/AIDS epidemiological data in Puerto Rico. Small groups outline the social groups that were most impacted by the epidemic. Their perceptions of impacted groups are then contrasted with actual epidemiological data. This process allows us to discuss how HIV/AIDS stigma can influence medical students’ perceptions of the epidemic and the role stigma plays in this process.

The second session addresses the role of negative emotions in fostering HIV/AIDS stigma attitudes and behaviors. Participants are exposed to clinical vignettes of HIV infection cases and asked to complete charts detailing the types of emotions they experienced when discussing the cases (e.g., fear, shame, disgust, admiration). Small group discussions on these cases are complemented with a whole group session in which the role of emotions in stigma is explained.

The third session provides participants with skills for stigma-free interaction with PLWHA. We discuss specific behavioral skills for interacting with PLWHA in clinical scenarios in a

non-stigmatizing manner. Furthermore, we discuss how HIV/AIDS stigma that is present in society could also be manifested in clinical encounters by both the physician (i.e., denying services) and PLWHA (i.e., self-stigmatizing attitudes).

The intervention was tested via a randomized control trial with 507 physicians in training. Due to the high burden of activities this group has as part of their training, the workshops were offered as extracurricular activities. The workshops were provided within students' medical schools in order to facilitate voluntary attendance and participation. The results from our longitudinal study evidenced that the SPACES intervention was effective in reducing HIV/AIDS stigma attitudes and that such changes were still present at 12 month after having completed the intervention (Varas-Díaz et al., 2013).

The role of emotions in stigma reduction

An integral aspect of the evaluation and dissemination of scientifically tested interventions to reduce HIV/AIDS stigma is to examine in detail how such attitudes are reduced. For example, most interventions to reduce HIV/AIDS stigma focus on providing information, development of skills, and contact with the affected group (Nyblade, Stangl, Weiss, & Ashburn, 2009; Stangl et al., 2013). Although these approaches vary greatly among different interventions, they tend to focus on the quality and quantity of information individuals possess and the skills they can implement with the acquired knowledge. Although information and skills are integral parts of changing attitudes and subsequent behaviors, we know from previous research that this is sometimes not enough for prolonged change. Individuals also need to become emotionally invested in the subject addressed via an intervention. Unfortunately, the published literature on HIV/AIDS stigma-reduction interventions is unclear on how emotional reactions to PLWHA are addressed in their programs and what role emotions play in the reduction of HIV/AIDS stigma.

Qualitative evidence has shown that health professionals in training in Puerto Rico experience negative emotions (e.g., fear, pity, embarrassment) when discussing potential interactions with PLWHA (Varas-Díaz & Marzan-Rodriguez, 2007). They also express a need to control their emotional responses when providing services to highly stigmatized patients, a decision which highlights the difficult nature of social interaction with PLWHA for some health professionals. Furthermore, negative emotions were expressed more frequently than positive emotions (e.g., solidarity, sympathy, admiration) when health professional trainees read vignettes describing PLWHA (Varas-Díaz & Marzan-Rodriguez, 2007). These findings are important because emotions have the function of providing meanings ascribed to individuals (Fridja & Mesquita, 1994). They can also influence how individuals react behaviorally to social interaction with others they deem as threatening or of less social value. Therefore, in these clinical scenarios experiencing negative emotions or expecting to have total control over these emotional responses has the potential to trigger stigma attitudes and behaviors that in turn can negatively impact service delivery.

In light of this gap in the scientific literature, the aim of this study was to assess the role of negative and positive emotions in the reduction of HIV/AIDS stigma attitudes among participants in the SPACES intervention. Because SPACES was informed by Social Cognitive Theory, we also explored the role of basic HIV/AIDS knowledge and perceived

self-efficacy for providing services to PLWHA as two other variables that could explain HIV/AIDS stigma reduction. The importance of these variables has also been suggested by other research on social stigma that has explored the interrelation between knowledge, self-efficacy, and social stigma in multiple areas of HIV/AIDS-related behaviors (Li et al., 2011; Wolf et al., 2007).

Methods

Sample

Second-year medical students ($N = 507$) were recruited from the four largest medical schools in Puerto Rico. Groups of 20 were randomized into intervention or control conditions. The control condition featured a time- and attention-matched HIV epidemiology workshop and the intervention condition featured an HIV stigma-reduction intervention (see Varas-Díaz et al., 2013). Measures were completed at baseline (T1) before workshop participation, immediately after (T2) finishing the last workshop, and participants were contacted by phone and email to complete the 6 (T3) and 12-month follow-ups (T4) over the web. A total of 385 out of our 507 participants (76%) completed the T4 measure.

Measures

Participants completed a self-administered questionnaire containing the following instruments.

Stigma and HIV/AIDS scale—This 44-item scale addresses the social meanings ascribed to PLWHA via a 5-point Likert scale with values ranging from strongly agree to strongly disagree. The scale is reliable for health professionals at $\alpha = .91$ (Varas-Díaz & Neilands, 2009).

Emotions associated with AIDS inventory¹—This inventory presents participants with HIV-related cases (e.g., homosexual man, heterosexual woman, IDU) and asks them to identify emotions (both positive and negative) that these evoke. Participants choose from the following options: fear, solidarity, sympathy, love, disillusion, pity, anger, disgust, happiness, and admiration. Participants can select a total of 10 emotions they have experienced while interacting with the described cases in the past. They are instructed to visualize the potential interaction if they have not have had such an experience. These emotions are equally divided between those that are considered as positive and negative, in light of previous qualitative work on the subject (Varas-Díaz & Marzan-Rodriguez, 2007).

HIV/AIDS basic knowledge scale—Composed of 10 true/false items, this scale measures knowledge of the virus in six areas: HIV/AIDS definitions, epidemiology, impact on health, means of transmission, means of prevention, and HIV tests and treatment and is reliable ($\alpha = .88$) in health-care professional samples (Pacheco-Bou Hernández-Cartagena, Cruz-González, Arroyo, Torres-Burgos, & Galarza, 2007).

¹We have not provided reliability data for this measure as it is an inventory.

Self-efficacy assessment scale—This nine-item inventory assesses participants' perceived self-efficacy for interacting with PLWHA in health settings via a 5-point Likert scale with values ranging from definitively can to definitively cannot. It has good reliability ($\alpha = .80$ and higher) in health-care professional samples (Varas-Díaz, 2005).

Data analysis

One-way frequency tables and measures of central tendency and variability were used to describe the sample. Classical methods of mediation involving cross-sectional data or longitudinal data where exposures, mediators, and outcomes are analyzed sequentially were not used because they can yield biased results from not including the information found in all time points' mediators and outcomes. Instead, assessment of mediation was performed using Mitchell and Maxwell's cross-lagged autoregressive approach, which reduces bias by including all time points' mediators and outcomes (Mitchell & Maxwell, 2013). Mediation models regressed HIV stigma at each time point onto intervention group assignment (0 = control; 1 = intervention) and the preceding time point's stigma score. Each mediator was regressed onto intervention group assignment and the preceding time point's mediator score. The stigma score was also regressed onto the preceding time point's mediator score. The residuals for mediators and stigma within the same time point were allowed to correlate. Following Mitchell and Maxwell's suggested parameterization of the autoregressive mediation model, regression coefficients, residual variances, and correlations among residuals were set equal across time.

Autoregressive mediation models were fitted using the structural equation modeling program *Mplus* 7.2. Estimation was performed using maximum likelihood with robust standard errors (*Mplus* estimator MLR). Global model fit was evaluated using the χ^2 test of exact model fit and the following approximate fit criteria: Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Error (SRMR). Satisfactory global model fit was determined via Hu and Bentler's threshold that any two of the three following conditions be met: CFI $\geq .95$, RMSEA $\leq .06$, and SRMR $\leq .08$ (Hu & Bentler, 1999). Models were minimally modified as needed to attain satisfactory global model fit. For each model we report the direct effects of intervention participation on stigma and the indirect effects of intervention participation on stigma via the mediator, with effects quantified as standard deviation changes in stigma. Because indirect effects are distributed asymmetrically, we report 95% confidence intervals for all effects from 5001 bias-corrected bootstrap resamples (MacKinnon, Lockwood, & Williams, 2004).

Results

Sample characteristics

The sample was approximately gender-balanced and was mostly heterosexual and Puerto Rican (Table 1). Nearly half the sample (46%) had tested for HIV. More than one fourth of the sample knew someone with HIV and the vast majority reported that HIV was discussed in their medical school coursework (Table 1). Eighty percent either disagreed or felt unsure that they were prepared to provide services to PWHA (Table 1).

Mediation analyses

Compared with control participants, intervention group participants had a significantly lower mean level of stigma, regardless of which mediator was included in the analysis (Table 2). Relative to the control group, the intervention group showed higher mean levels of HIV/AIDS knowledge, self-efficacy, and positive emotions. However, indirect effects revealed that only higher levels of positive emotions resulted in lower levels of subsequent stigma for intervention participants (Table 2). Because the direct effect of intervention group on stigma is still significant when positive emotions is included in the analysis, positive emotions partially mediated the relationship between intervention participation and HIV/AIDS stigma.

Discussion

Researchers need to understand how changes due to stigma intervention exposure are being generated and sustained. Our results represent an initial yet important step in documenting the underlying mechanisms of change in HIV/AIDS stigma-reduction interventions and will inform future efforts to reduce HIV/AIDS stigma with new populations and in other settings.

Our analysis revealed that experiencing more positive emotions in those interactions resulted in lower levels of subsequent stigma for intervention participants. Information about HIV/AIDS had no influence on stigma reduction. These results demonstrate that the provision of HIV/AIDS-related information should not be the sole mechanism used in HIV/AIDS stigma-reduction interventions as a mechanism of attitudinal change. As in the case of prevention interventions to reduce the behavioral risk of HIV, we find that information alone is insufficient to reduce the stigmatization of PLWHA among physicians in training. Unfortunately, the training of health professionals does not place as much importance on emotional reaction to social interaction with stigmatized patients as it should (Varas-Díaz & Marzan-Rodriguez, 2007).

Increasing positive emotions toward PLWHA, in general social interaction and when providing health-related services, was a significant mechanism of change of our stigma-reduction intervention. Still, they did not completely mediate the group–stigma relationship. Therefore, other mechanisms of change also contributed to the intervention-based differences in stigma we observed and need to be further explored in the future. Furthermore, due to the heavy burden placed on medical students in terms of their training and time management there may have been self-selection bias in our sample.

Based on these results, we propose several recommendations for stigma-reduction efforts. First, social scientists need to continue developing and testing interventions to reduce HIV/AIDS stigma that are systematically evaluated and whose effects are assessed through standardized stigma measures. Research reports describing these interventions need to explore the underlying mechanisms that are predicting attitudinal change. This will enable other researchers to explore if these variables are appropriate for other intervention contexts and populations. These strategies will allow for more rigorous and transparent methodological strategies when developing and testing stigma-reduction interventions (Stangl et al., 2013).

Second, medical schools would benefit from the integration of stigma-reduction interventions that address the emotional dimension of HIV/AIDS stigmatization since it will allow them to supplement information-based pedagogy that tends to dominate academic programs. Furthermore, these interventions address issues that are rarely incorporated into traditional curricula, including discussions of the consequences of social exclusion. This integration of emotional reactions to actual or potential interactions with PLWHA has the potential to foster linkages between stigma-reduction interventions, medical training programs, and existing theoretical positions on social stigma made by scholars like Goffman (1963). Emotions can function as a key component of the negative social meanings ascribed to individuals that are affected by disease and whose humanity (to use Goffman-based terminology) is brought into question. As stated earlier, emotions are important when ascribing meaning to an event or individual (Fridja & Mesquita, 1994). Therefore, health professionals in training need to be exposed to a critical exploration of the functions of those emotions in ascribing meaning and subsequent characterization of patients.

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References

- Bandura, A. Social cognitive theory and personality. In: Pervin, LA.; John, OP., editors. *Handbook of personality: Theory and research*. New York, NY: Guilford Press; 1999. p. 154-196.
- Brown L, Macintyre K, Trujillo L. Interventions to reduce HIV/AIDS stigma: What have we learned? *AIDS Education and Prevention*. 2003; 15(1):49–69. [PubMed: 12627743]
- Earnshaw, Va; Smith, LR.; Chaudoir, SR.; Amico, KR.; Copenhaver, MM. HIV stigma mechanisms and well-being among PLWH: A test of the HIV stigma framework. *AIDS and Behavior*. 2013; 17(5):1785–1795. [PubMed: 23456594]
- Ekstrand ML, Ramakrishna J, Bharat S, Heylen E. Prevalence and drivers of HIV stigma among health providers in urban India: Implications for interventions. *Journal of the International AIDS Society*. 2013; 16(3 Suppl. 2):18717. [PubMed: 24242265]
- Famoroti TO, Fernandes L, Chima SC. Stigmatization of people living with HIV/AIDS by healthcare workers at a tertiary hospital in KwaZulu-Natal, South Africa: A cross-sectional descriptive study. *BMC Medical Ethics*. 2013; 14(Suppl. 1):S6. [PubMed: 24564982]
- Fridja, NH.; Mesquita, B. The social roles and functions of emotions. In: Kitayama, S.; Markus, HR., editors. *Emotion and cultures: Empirical studies of mutual influence*. Washington, DC: American Psychological Association; 1994. p. 350-367.
- Goffman, E. *Stigma; notes on the management of spoiled identity*. A spectrum book. Englewood Cliffs, NJ: Prentice-Hall; 1963. p. 147
- Grossman CI, Stangl AL. Editorial: Global action to reduce HIV stigma and discrimination. *Journal of the International AIDS Society*. 2013; 16(3 Suppl. 2):18881. [PubMed: 24242269]
- Herek GM. AIDS and stigma. *American Behavioral Scientist*. 1999; 42:1106–1116.
- Hu L, Bentler P. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*. 1999; 6:1–55.
- Jones, EE.; Farina, A.; Hastorf, AH.; Markus, H.; Miller, DT.; Scott, RA. *Social stigma: The psychology of marked relationships*. New York: W.H. Freeman; 1984.

- Li L, Lin C, Guan J, Wu Z. Implementing a stigma reduction intervention in healthcare settings. *Journal of the International AIDS Society*. 2013; 16(3 Suppl. 2):18710. [PubMed: 24242261]
- Li X, Huang L, Wang H, Fennie K, He G, Williams A. Stigma mediates the relationship between self-efficacy, medication adherence, and quality of life among people living with HIV/AIDS in China. *AIDS Patient Care and STDs*. 2011; 25:665–671. [PubMed: 22023316]
- Li X, Wang H, Williams A, He G. Stigma reported by people living with HIV in south central China. *Journal of the Association of Nurses in AIDS Care*. 2009; 20(1):22–30. [PubMed: 19118768]
- MacKinnon D, Lockwood C, Williams J. Confidence limits for the indirect effect: Distribution of the product and resampling methods. *Multivariate Behavioral Research*. 2004; 39:99–128. [PubMed: 20157642]
- Mak WWS, Cheng SSY, Law RWM, Cheng WWL, Chan F. Reducing HIV-related stigma among healthcare professionals: A game-based experiential approach. *AIDS Care*. 2015; 27:855–859. [PubMed: 25671591]
- Mitchell M, Maxwell S. A comparison of the cross-sectional and sequential designs when assessing longitudinal mediation. *Multivariate Behavioral Research*. 2013; 48:301–339. [PubMed: 26741846]
- Nyblade L, Stangl A, Weiss E, Ashburn K. Combating HIV stigma in health care settings: What works? *Journal of the International AIDS Society*. 2009; 12(1):15. [PubMed: 19660113]
- Pacheco-Bou Hernández-Cartagena, M.; Cruz-González, D.; Arroyo, LE.; Torres-Burgos, N.; Galarza, MW. HIV/AIDS basic information scale. San Juan: University of Puerto Rico's University Center for Psychological Services and Research; 2007.
- Rahmati-Najarkolaei F, Niknami S, Aminshokravi F, Bazargan M, Ahmadi F, Hadjizadeh E, Tavafian SS. Experiences of stigma in healthcare settings among adults living with HIV in the Islamic Republic of Iran. *Journal of the International AIDS Society*. 2010; 13:27. [PubMed: 20649967]
- Sayles JN, Wong MD, Kinsler JJ, Martins D, Cunningham WE. The association of stigma with self-reported access to medical care and antiretroviral therapy adherence in persons living with HIV/AIDS. *Journal of General Internal Medicine*. 2009; 24(10):1101–1108. [PubMed: 19653047]
- Stangl AL, Lloyd JK, Brady LM, Holland CE, Baral S. A systematic review of interventions to reduce HIV-related stigma and discrimination from 2002 to 2013 : How far have we come? *Journal of the International AIDS Society*. 2013; 16(3 Suppl. 2):18734. [PubMed: 24242268]
- Varas-Díaz, N. HIV/AIDS skills and self-efficacy assessment inventory. San Juan: Graduate School of Social Work, University of Puerto Rico; 2005.
- Varas-Díaz N, Malavé-Rivera S, Cintrón-Bou F. AIDS stigma combinations in a sample of Puerto Rican health professionals: Qualitative and quantitative evidence. *Puerto Rico Health Sciences Journal*. 2008; 27(2):1–11.
- Varas-Díaz N, Marzan-Rodríguez M. The emotional aspect of AIDS stigma among health professionals in Puerto Rico. *AIDS Care*. 2007; 19(10):1247–1257. [PubMed: 18071968]
- Varas-Díaz N, Neilands TB. Development and validation of a culturally appropriate HIV/AIDS Stigma Scale for Puerto Rican health professionals in training. *AIDS Care*. 2009; 21(10):1259–1270. [PubMed: 20024702]
- Varas-Díaz N, Neilands TB, Cintrón-Bou F, Marzán- Rodríguez M, Santos-figueroa A, Santiago-Negrón S, Rodríguez-Madera S. Testing the efficacy of an HIV stigma reduction intervention with medical students in Puerto Rico: The SPACES project. *Journal of the International AIDS Society*. 2013; 16(3 Suppl. 2):1867.
- Varas-Díaz N, Neilands TB, Malave Rivera S, Betancourt E. Religion and HIV/AIDS stigma: Implications for health professionals in Puerto Rico. *Global Public Health*. 2010:1–18. [PubMed: 19513914]
- Whetten K, Reif S, Whetten R, Murphy-Mcmillan L. Trauma, mental health, distrust, and stigma among HIV-positive persons: Implications for effective care. *Psychosomatic Medicine*. 2008; 70(5):531–538. [PubMed: 18541904]
- Wolf MS, Davis TC, Osborn CY, Skripkauskas S, Bennett CL, Makoul G. Literacy, self-efficacy, and HIV medication adherence. *Patient Education and Counseling*. 2007; 65:253–260. [PubMed: 17118617]

- Wu S, Li L, Wu Z, Liang LJ, Cao H, Yan Z, Li J. A brief HIV stigma reduction intervention for service providers in China. *Aids Patient Care and Stds*. 2008; 22(6):513–520. [PubMed: 18462076]
- Yiu JWY, Mak WWS, Ho WSK, Chui YY. Effectiveness of a knowledge-contact program in improving nursing students' attitudes and emotional competence in serving people living with HIV/AIDS. *Social Science & Medicine*. 2010; 71:38–44. [PubMed: 20430503]

Table 1

Sample characteristics ($N = 507$).

Variable	Intervention		Control		χ^2 (DF)	p
	N	%	N	%		
Male gender ^a	123	45.4	109	46.2	0.03 (1)	.86
Heterosexual orientation ^{a,b}	264	97.8	233	98.7	0.67 (1)	.41
National origin ^{a,b}					7.69 (3)	.053
Puerto Rican	213	78.9	204	86.4		
Dominican	1	0.4	3	1.3		
Cuban	10	3.7	5	2.1		
Other	46	17.0	24	10.2		
Ever tested for HIV ^a	125	46.3	108	46.4	0.0002 (1)	.99
HIV negative test result (among those who tested) ^a	123	96.1	99	94.3	0.42 (1)	.55
Knew someone with HIV ^a	79	29.7	61	26.9	0.48 (1)	.49
Taken a class where HIV was discussed ^a	239	88.2	196	83.4	2.39 (1)	.12
Believe other medical students discriminate ^a	245	90.7	216	92.3	0.40 (1)	.53
Religion importance ^c					0.67 (1)	.41
Not important	29	10.7	18	7.6		
Somewhat important	69	25.6	57	24.2		
Important	89	33.0	90	38.1		
Very Important	83	30.7	71	30.1		
Annual income ^c					0.08 (1)	.77
<\$10,000	81	31.6	89	39.6		
\$10,001–\$20,000	30	11.7	17	7.6		
\$20,001–\$30,000	26	10.2	16	7.1		
\$30,001–\$40,000	37	14.5	23	10.2		
\$40,001–\$50,000	30	11.7	15	6.7		
\$50,001–\$60,000	8	3.1	12	5.3		
>\$60,000	44	17.2	53	23.6		

Variable	Intervention			Control			χ^2 (DF)	p
	N	%		N	%			
Perception of risk of HIV infection ^c							2.96 (1)	.09
Not at all	73	27.2	56	39.6				
A little	150	56.0	116	49.6				
A regular amount	31	11.6	52	22.2				
A lot	14	5.2	10	4.3				
Medical students attitudes toward PLWHA ^c							0.26 (1)	.61
Totally positive	12	4.4	12	5.1				
Partially positive	72	26.6	56	23.8				
Neutral	123	45.4	106	45.1				
Partially negative	64	23.6	61	26.0				
Prepared to provided services to PLWHA ^c							1.40 (1)	.24
Totally agree	13	4.8	7	3.0				
Partially agree	42	15.5	39	16.5				
Undecided	178	65.7	146	61.9				
Partially disagree	38	14.0	44	18.6				

Notes: Percentages and Ns will not always sum to 100% due to small amounts of missing data and rounding. For sexual orientation, the reference category is homosexual/lesbian/bisexual; for HIV testing, the reference group is "Don't know" (no participants reported an HIV-positive test result).

^a χ^2 results for unordered categorical variables are based on the likelihood ratio test.

^b Exact *p*-value was used due to expected cell counts less than 5.

^c χ^2 results are for the ordinal variables are based on the Mantel–Haenszel χ^2 .

Table 2Mediation analysis results ($N = 507$).

Global model fit	HIV/AIDS knowledge	Self-efficacy	Negative emotions	Positive emotions
χ^2 (DF), p	89.67 (30), <.001	95.94 (29), <.001	112.20 (30), <.001	128.68 (30), <.001
CFI	.96	.95	.96	.95
RMSEA	.06	.07	.07	.08
SRMR	.04	.06	.04	.05
Direct effects	β (95% CI)	β (95% CI) ^a	β (95% CI)	β (95% CI)
Mediator (Time T)				
Group (Time $T - 1$)	.099 (.002, .190)*	.076 (.014, .138)*	.014 (−.060, .094)	.106 (.047, .190)*
Mediator (Time $T - 1$)	.499 (.423, .561)*	.911 (.800, 1.02)*	.676 (.632, .730)*	.718 (.676, .762)*
Stigma (Time $T - 1$)	−.010 (−.016, −.006)*	.000 (−.004, .004)	.011 (.006, .014)*	−.007 (−.011, −.003)*
Stigma (Time T)				
Group (Time $T - 1$)	−1.26 (−1.94, −.659)*	−1.27 (−1.91, .638)*	−1.27 (−1.92, −.667)*	−1.23 (−1.85, −.595)*
Mediator (Time $T - 1$)	.010 (−.425, .340)	−.429 (−.792, −.066)*	.322 (−.058, .702)	−.437 (−.805, −.055)*
Stigma (Time $T - 1$)	.795 (.759, .827)*	.784 (.745, .823)*	.779 (.746, .821)*	.779 (.741, .817)*
Indirect effects of group via mediators listed below				
Stigma (Time T)				
Stigma (Time $T - 1$)	−1.001 (−1.54, −.518)*	−.998 (−1.50, −.502)*	−.986 (−1.49, −.527)*	−.961 (−1.45, −.469)*
Mediator (Time $T - 1$)	.001 (−.048, .044)	−.033 (−.073, .008)	.005 (−.016, .047)	−.046 (−.128, .011)*
Stigma (Time $T - 2$), Stigma (Time $T - 1$)	−.796 (−1.23, −.406)*	−.782 (−1.17, −.391)*	−.768 (−1.18, −.424)*	−.749 (−1.15, −.368)*
Mediator (Time $T - 2$), Stigma (Time $T - 1$)	.001 (−.039, .035)	−.025 (−.057, .006)	.004 (−.012, .037)	−.036 (−.097, −.008)*
Stigma (Time $T - 2$), Mediator (Time $T - 1$)	.000 (−.007, .004)	.000 (−.003, .003)	−.004 (−.012, .001)	−.004 (−.001, −.011)*
Mediator (Time $T - 2$), Mediator (Time $T - 1$)	.001 (−.025, .022)	−.030 (−.067, .008)	.003 (−.011, .033)	−.033 (−.090, −.008)*

Notes: Group was coded as 0 for control group participants and 1 for intervention group participants. Global model fit tests were computed in *Mplus* 7.2 using full-information maximum likelihood estimation with robust test statistics (*Mplus* estimator MLR). Regression coefficients (β) were estimated via full-information maximum likelihood using *Mplus* 7.2; 95% confidence intervals were estimated via the bias-corrected residual bootstrap based on 5001 replicate samples.

T1, baseline; T2, immediately following the intervention; T3, 6 months; T4, 12 months.

^aThe model includes constant correlations among the residuals for self-efficacy ($r = -.38$; 95% CI = $-.53, -.23$).

* Confidence intervals which do not include zero are significant at $p < .05$.