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Measuring HIV-related Stigma Among Chinese Service Providers:

Confirmatory Factor Analysis of a Multidimensional Scale

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Abstract

An HIV-related stigma scale for health care workers needs to be multidimensional in that it should encompass attitudes that might be experienced by the general public about people living with HIV/AIDS (PLWHA) (e.g., fear, shame, blame) and, further, specifically capture perceptions of appropriate professional care and medical responsibilities regarding PLWHA. A 17-item, 5-factor multidimensional HIV-related stigma scale was developed and validated using both exploratory and confirmatory factor analysis among 1,101 service providers in China. The sample was divided into a development sample ($N = 551$) and a validation sample ($N = 550$). The fit of the final confirmatory factor model with five hypothesized subscales was excellent in both samples. The final stigma subscales included: Discrimination Intent at Work, Opinion about Health Care for HIV/AIDS Patients, Prejudiced Attitudes, Internalized Shame, and Fear of PLWHA.

Keywords

HIV/AIDS stigma; Scale development; Confirmatory factor analysis; China; Service providers

Introduction

Understanding the extent and dimensions of HIV-related stigma among service providers who may need to care for patients living with HIV/AIDS (PLWHA) is crucial in terms of both the provider-patient relationship and the mental health and well-being of the providers themselves (Li et al. 2007a). A good set of measures that captures the complexity and multidimensionality of stigma is critical in order to facilitate and assess the effectiveness of HIV intervention programs, especially in a medical setting (Van Brakel 2006). Varied aspects of stigma would include general attitudes towards PLWHA, feelings about the rights of such patients, professional attitudes, and the way service providers would feel about themselves if they were caring for such patients or associating with PLWHA.

HIV-related stigma was defined by Herek (1999) as “prejudice, discounting, discrediting, and discrimination directed at people perceived to have AIDS.” In addition to experiencing possibly negative attitudes about PLWHA themselves, health service providers may worry that others will perceive them negatively too if they care for PLWHA (e.g., Snyder et al. 1999).

Furthermore, there has been a long-standing concern about burnout among health care professionals who care for PLWHA (Shoptaw et al. 2000) or among others who work with PLWHA (Snyder et al. 1999).

With the recent HIV testing and treatment campaigns in China (Wu et al. 2007), service providers are currently confronting a large increase in patients living with HIV/AIDS. Unfortunately, stigma related to HIV/AIDS is high in China (Lee et al. 2005; Lieber et al. 2006; Liu et al. 2006). Negativity toward PLWHA hampers prevention and control of the disease (Chen et al. 2005; Lieber et al. 2006). In addition, Chen et al. (2005) found that individuals living in areas in China with more community level HIV-related risk behaviors (defined as “neighborhood risk”) reported more negative feelings about PLWHA. These HIV-risk behaviors included commercial sex activity, drug use, and selling blood (which is considered a risk behavior in China).

According to a report from the U.S. Agency for International Development, Office of HIV/AIDS (USAID 2003), there has been little or no development of a reliable way to measure stigma among individuals involved with prevention and care programs. Stigma is an intangible phenomenon (USAID 2003), which might well be measured better with a latent variable, multidimensional approach. Latent variables are higher-order constructs that capture the shared variance among measured indicator variables. In the current study, we use latent variable confirmatory analytic techniques to assess and verify the psychometric properties of a multidimensional stigma questionnaire designed for service providers in China. Confirmatory factor analysis (CFA), which is a special case of structural equation modeling and extends well beyond a typical exploratory factor analysis (EFA), is the method of choice for validating the dimensionality of a factor structure that is hypothesized a priori or first developed in an EFA and then confirmed through CFA (Bentler and Stein 1992; Floyd and Widaman 1995; Stein et al. 2006; Ullman 2006). The confirmatory model can be verified through use of various fit statistics that report whether a set of data conforms to the model that is imposed upon it and whether the factors represent separable dimensions of the proposed model.

Several stigma scales have been designed for PLWHA in particular and those scales are more likely to be unidimensional psychometrically. Using traditional exploratory factor analytic techniques, Berger et al. (2001) found evidence for a higher order factor within a four-factor HIV stigma scale designed for PLWHA. Other scales have been developed that are useful in various settings to tap attitudes of both PLWHA and the general population. For instance, Kalichman et al. (2005) developed a short psychometrically unidimensional 9-item scale to measure HIV/AIDS-related stigma in South Africa in general populations. AIDS-related stigma is pervasive in South African society and impedes voluntary testing and other prevention efforts (Kalichman and Simbayi 2004; Kalichman et al. 2005).

However, other stigma scales have meaningful subscales that are able to capture the multidimensional, complex nature of HIV-related stigma especially among those who are not PLWHA themselves (Deacon 2006; Emler 2005; Fife and Wright 2000; Kang et al. 2005; Reidpath and Chan 2005). Nyblade (2006) pointed out several gaps in measurement including capturing the complexity of HIV-related stigma. To tap relevant dimensions reflecting stigmatizing attitudes among service providers in particular towards PLWHA as well as towards themselves for their connections with PLWHA, a more multidimensional approach may be needed. This is especially the case because stigmatizing attitudes among service providers may be more complex as they need to be able to separate their personal underlying prejudices of PLWHA from their professional responsibilities. The stigma associated with HIV is layered with other stigmas such as proscribed routes of transmission (e.g., sex work and injection drug use) as well as personal characteristics (Herek et al. 2002; Reidpath and Chan 2005).

Five domains, two of which are particularly relevant to service providers, were hypothesized a priori to capture varying aspects of HIV-related stigma. A portion of a larger survey instrument contained candidate items that were hypothesized to reflect these domains. First, health care providers may share the *general prejudices* of the greater population vis-à-vis HIV/AIDS and PLWHA regardless of their professional work and training especially when HIV/AIDS was contracted through proscribed behaviors rather than, for instance, mother-child transmission. Second, feelings of *shame* that one would feel in working with HIV/AIDS patients or having relatives or acquaintances with HIV/AIDS were assessed. It was also hypothesized that there would be *fear* of PLWHA. Then, two subscales were hypothesized and devised that are most relevant to service providers. One subscale assesses their own beliefs regarding the *care that is deserved* by HIV/AIDS patients and the other assesses what they anticipate their own *professional behaviors* would be towards HIV/AIDS patients. This would include physical examinations and other interactions. Some of the subscales correspond to content areas suggested by Herek et al. (2002) (e.g., negative feelings toward PLWHA) and the additional scales that reflect service provision are unique to this instrument.

Methods

Participants and Procedures

Data were collected from three different sites in a south-western province in China. Participants consisted of service providers who were currently working at general public health care facilities in the area. Public health care facilities in China are organized on six different levels: national, provincial, city/prefecture, county hospitals, township hospitals, and village health clinics. Generally, hospitals at higher levels serve a broader region and are more likely to have technologically advanced equipment and a more highly educated staff. Such hospitals have the capacity and resources to perform more sophisticated operations, and therefore also are more likely to attract more patients.

In order to obtain a representative sample, three provincial hospitals, four city/prefecture hospitals, 10 county hospitals, 18 township health clinics, and 54 village clinics were randomly selected. The ratio of doctors to nurses in each hospital was used as the sampling scheme, and hospital laboratory technicians were over-sampled to allow for their adequate representation in the analysis. A total of 1,101 randomly selected service providers participated in the self-administered survey between January and August, 2005, with less than an 8% refusal rate. All survey data were collected anonymously. The sample was 74% female; 50.6% were doctors, 39.9% were nurses, and 9.5% were laboratory technicians. Individual informed consent was obtained prior to administration of the survey. Each participant received a \$10 gift.

Instrumentation

The hypothesized stigma items and subscales are contained within the larger Health Professional Survey which has a total of 172 questions on topics ranging from demographics, training, experience, knowledge, institutional support, and attitudes and behaviors towards AIDS patients and PLWHA in general (Li et al. 2007a, b, c). Five subscales with an initial 21 items within the 172-item questionnaire were considered to reflect aspects of stigmatizing attitudes towards PLWHA or towards oneself if one deals with PLWHA. Items were developed based on outlines provided by USAID (2003) for assessing stigma in a variety of health care settings or other venues relevant to HIV/AIDS, as well as working reports from USAID (2005), and the Joint United Nations Program on HIV/AIDS (UNAIDS 2000).

The subscales hypothesized to reflect stigma after the EFA were as follows (all items were reversed when appropriate to have higher scores reflect more prejudicial attitudes; choices ranged from 1-5): (1) *Discrimination Intent at Work* (4 items), sample item: “You would be

willing to work with HIV positive patients”; (2) *Prejudiced Attitudes* (4 items), sample item: “People who got HIV/AIDS through sex and drug use got what they deserved”, (3) *Opinion about Health Care for HIV/AIDS Patients* (3 items), sample item: “People who got infected with HIV/AIDS through drug use deserve good quality medical care”; (4) *Internalized Shame* (3 items), sample item: “If you worked with HIV positive patients, you would feel embarrassed to tell other people about it”, (5) *Fear of PLWHA* (3 items), sample item: “You feel afraid of PLH.”

Analysis

Because the sample was quite large, the sample was split in half. The even-numbered cases ($N = 550$) were used in the EFA and the odd-numbered cases were used for the CFA ($N = 551$). The preliminary EFA indicated that there were five factors. There were five eigenvalues greater than 1 and content areas matched the domains hypothesized when the scale was designed. In addition to the eigenvalue > 1 criterion (Kaiser-Guttman), we also examined results of a scree test, which in some cases may be more accurate than the eigenvalue criterion (Floyd and Widaman 1995). The scree plot was most suggestive of a 5-factor solution. Furthermore, the 5-factor solution accounted for over 64% of the total variance of the measured variables whereas a solution with four factors accounted for only about 57% of the total variance. Seventeen items were most viable. Then a CFA was conducted on the other half of the sample. CFA is an excellent way of determining whether a hypothesized factor structure with separable dimensions underlies a scale and is currently the methodology of choice for assessing such relations. It provides estimates of the relations between measured variables and the hypothesized constructs or factors, and also provides fit indexes that report whether the hypothesized structure of associations fits the data. The relations between the measured and latent variables are reported as individual factor loadings; the part of the variability that is not explained by the construct remains as error in measured variables effectively isolating the latent construct from error that is unique to the measured variables.

Goodness-of-fit of the models was assessed with the Satorra-Bentler χ^2 (S-B χ^2), the Robust Comparative Fit Index (RCFI; Bentler 2006), and the root mean square error of approximation (RMSEA). The Robust S-B χ^2 was used because it is more appropriate than the standard maximum likelihood χ^2 when the data depart from multivariate normality and the Mardia multivariate kurtosis estimate was high in both samples. A non-significant χ^2 is desirable for goodness-of-fit but the significance of χ^2 is dependent on the size of the sample and the number of degrees of freedom in the model. The RCFI, an additional indicator of fit, ranges from 0 to 1 and reflects the improvement in fit of a hypothesized model over a model of complete independence among the measured variables. The RCFI adjusts for sample size; values of .95 or greater are desirable and indicate that the hypothesized model reproduces 95% or more of the covariation in the data (Hu and Bentler 1999). We also report the RMSEA for the models (Steiger 1990; Browne and Cudeck 1993). The RMSEA indicates lack of fit per degrees of freedom, controlling for sample size, and values less than .06 indicate a close fitting model (Ullman and Bentler 2003).

To improve fit, we allowed a minimal number of supplementary correlated error residuals based on suggestions from the Lagrange Multiplier (LM) Test (Chou and Bentler 1990). If the suggestions were not plausible or logical they were not added. After this procedure, we used the even-numbered cases once again as an additional validation sample on which we could test the final CFA model. This allowed us to avoid capitalizing on chance relationships in the data due to model modification with correlated error residuals (Dukes and Stein 2001; MacCallum et al. 1992).

Construct Validity

Participants were presented with two case vignettes that were worded the same but in one set of items, an individual was described as having Hepatitis B and in the other vignette, he was described as having AIDS (Li et al. 2007c). The participants rated various statements about this man on a 1-5 scale ranging from “strongly agree” to “strongly disagree.” For example, one item stated that the man “is responsible for his illness.” By subtracting the rating of Hepatitis B from the rating for AIDS (suitably reversed when necessary), we obtained a discrepancy or difference score with higher scores indicating a more negative reaction to the man with AIDS than the reaction towards the man with Hepatitis B. We obtained a mean discrepancy score from each participant and correlated these scores with the five factors. We hypothesized that the difference scores would be in the positive direction (more negative ratings for someone with AIDS than with Hepatitis B) and that the work-related factors would have lower correlations with the difference scores than the more emotionally based general factors of fear, shame, and general prejudiced attitudes.

Results

Initial and Final CFA in Development Group

The initial CFA with the final 17-item scale based on the preliminary EFA and no supplementary correlated error residuals did not fully meet the standards of a well-fitting model although the RMSEA was acceptable and the RCFI was greater than .90 (S-B χ^2 (109 df, $N = 551$) = 315.48; RCFI = .91; RMSEA = .06). However, after the addition of only three reasonable correlated error residuals (all $P < .01$), the fit improved considerably (S-B χ^2 (106 df, $N = 551$) = 272.64; RCFI = .95; RMSEA = .05). Table 1 reports the summary statistics and factor loadings for the scale before and after model modification. Two correlated error residuals were between similar items within the same scale: (1) “You would not buy from a vendor with HIV/AIDS.” and “You would not share eating utensils with a PLH because you are afraid of HIV infection”; and (2) “People who got infected with HIV/AIDS through commercial sex activities deserve sympathy” and “People who got infected with HIV/AIDS through drug use deserve sympathy.” One cross-factor correlated error residual was between items with some similarity: “People who got infected with HIV/AIDS through commercial sex activities deserve good quality medical care” and “People who got infected with HIV/AIDS through commercial sex activities deserve sympathy.”

Validation Sample

The final CFA model with the three correlated error residuals was tested with the validation sample that was used initially in the EFA as the development sample. Factor loadings and other summary statistics are also presented in Table 1 for the validation sample. Fit statistics were roughly equal to those for the development sample (S-B χ^2 (106 df, $N = 550$) = 229.83; RCFI = .95; RMSEA = .05). Most importantly, all post hoc correlated error residuals added to the development sample model as suggested by the LM test were significant for the validation sample ($P < .01$) indicating that the additions were not capitalizing on chance relationships in the data.

Correlations Among Latent Variables

Correlations among the subscales are presented in Table 2 for both the development and validation samples. Correlations are reasonably similar for the two groups and correlations were significant among the subscales. Most correlations were in the .30-.50 range although the correlations between Shame and Fear were large in both groups. A second-order factor was tested in this sample to ascertain whether one over-arching factor could explain or account for the relations among the separate scales and the fit of this model was significantly worse

indicating that the 5-factor solution within the CFA was optimal for the hypothesized stigma scale in both samples.

Construct Validation

As hypothesized, the difference score was positive for the two case vignettes in which opinions about an individual with HIV/AIDS were contrasted with opinions about an individual with Hepatitis B (mean difference score = .43, $SD = .45$). The respondents were less sympathetic to the PLWHA. Further, correlations between the difference scores and the factors were considerably smaller and weaker for the two work-related factors (.12, and .10 for Discrimination Intent at Work and Good Care for HIV Patients) than for the more emotional, general stigma factors (Prejudiced Attitudes (.29), Shame (.18), and Fear (.33)). The correlations were similar in the second sample.

Discussion

This study described the development and validation through CFA of a multidimensional stigma scale specifically designed for service providers. No such scale is currently available. Although the scale was developed initially for providers in China where HIV-related stigma is particularly high, it could be used in a variety of settings. HIV-related stigma is prevalent internationally (Herek et al. 2002; Kalichman and Simbayi 2004) and service providers are in the front lines dealing with PLWHA and their varied care and treatment needs. Feelings of stigma either towards themselves due to dealings with PLWHA or towards PLWHA could impede the provision of adequate and sensitive care for PLWHA. This scale discriminated successfully between various personal attitudes and work-related attitudes. We suggest further validation by testing the scale among service providers in other countries or in other settings.

The multidimensional nature of this instrument is central to our findings. A unidimensional scale would not have worked as well as the multidimensional scale that was designed to capture varied aspects of stigma as experienced by health care workers on both a personal and professional level. The hypothesized five-factor structure was supported statistically in the EFA and the CFA; furthermore, we also tested and rejected a second-order factor within this scale.

The various scales in this instrument dealt with both professional attitudes and personal beliefs. Although the scales were distinct and the five-factor solution was confirmed, there were substantial associations among the subscales as reported in the correlation table. The participants in this study did not separate their personal feelings of prejudice against PLWHA from their professional attitudes adequately. There were highly significant associations between professional attitudes such as discrimination intent against PLWHA in their work settings and believing in (less) good care for PLWHA who contracted HIV through proscribed activities, and other prejudiced attitudes of shame, fear, and blame. It was encouraging, however, that the correlations revealed in the case vignettes against PLWHA as opposed to individuals with Hepatitis B were much smaller for the two medically oriented professional scales. There is clearly an ability when confronted with a hypothesized medical situation to distinguish between professional responsibilities and personal prejudice.

For PLWHA to receive optimum care, their service providers need to be able to separate their personal prejudices and feelings of stigmatization from their professional attitudes and behaviors toward their patients. The identification of various possible manifestations of HIV stigma can help service providers to better recognize and identify how HIV stigma may impact the lives of their patients as well as their own lives. Further exploring the source of each dimension identified in more detail will assist in the development of more focused and meaningful interventions. For instance, to address the fear of AIDS, interventions may involve

education programs that provide detailed information about possible transmission routes and universal precautions that must be taken at work. The findings of this study are undoubtedly not unique to service providers in China alone. An instrument such as the one reported in this study would be helpful in assessing HIV-related stigma and its impact on service delivery and would aid in designing effective intervention programs for those on the front lines of service provision for people living with HIV/AIDS around the world.

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Summary statistics, Cronbach's alpha coefficients (α), and factor loadings for development and validation samples

Table 1

Factors	Devel. mean (SD)		Valid. mean (SD)		Factor loadings		
	Devel. mean (SD)	Valid. mean (SD)	Before modification development sample	After modification development sample	Validation sample		
Discrimination intent at work (range 1-5) (devel. $\alpha = .82$, valid. $\alpha = .84$)							
Willing to work with HIV + patients	1.92 (0.63)	1.96 (0.71)	.73	.73	.73		
Willing to provide same care	1.81 (0.60)	1.82 (0.60)	.78	.79	.82		
Willing to do physical exam of HIV + patient	1.87 (0.62)	1.86 (0.58)	.77	.77	.82		
Willing to interact same as other patients	1.96 (0.66)	1.96 (.67)	.65	.65	.66		
Prejudiced attitudes (range 1-5) ($\alpha = .68$, .72)							
People who got HIV/AIDS through sex and drug use, got what they deserved	2.67 (1.08)	2.74 (1.06)	.36	.62	.72		
Infected through commercial sex deserve sympathy (R)	3.95 (1.06)	3.98 (1.08)	.78	.45	.45		
Infected through drug use deserve sympathy (R)	4.13 (0.98)	4.14 (1.01)	.78	.48	.45		
People who behave promiscuously should be blamed for AIDS	3.76 (1.01)	3.78 (0.97)	.41	.54	.54		
Internalized shame (range 1-5) ($\alpha = .69$, .75)							
If worked with HIV positive patients, want to change job	2.21 (0.86)	2.17 (0.83)	.42	.44	.57		
Ashamed if know someone with AIDS	2.21 (0.71)	2.22 (0.75)	.80	.79	.76		
Ashamed if relative got HIV/AIDS	2.50 (0.93)	2.54 (1.00)	.72	.72	.71		
Fear of AIDS (range 1-5) ($\alpha = .73$, .71)							
Afraid of PLH	2.66 (1.06)	2.80 (1.15)	.55	.72	.69		
Not buy from vendor with HIV/AIDS	3.18 (1.03)	3.23 (1.09)	.78	.55	.50		
Wouldn't share utensils w/PLH	2.92 (1.06)	3.00 (1.07)	.77	.55	.52		
Good care for HIV patients (1-5) ($\alpha = .79$, .77)							
Deserve good care-blood donation (R)	1.82 (0.70)	1.84 (0.80)	.52	.52	.45		

Factors	Devel. mean (SD)	Valid. mean (SD)	Factor loadings		
			Before modification development sample	After modification development sample	Validation sample
Deserve good care-commercial sex (R)	2.39 (1.15)	2.42 (1.19)	.88	.87	.84
Deserve good care-drug use (R)	2.46 (1.15)	2.49 (1.24)	.88	.89	.95

R = reverse-scored

Table 2
Correlations among latent factors in Confirmatory Factor Analysis (** = $P < .01$)

Variables	1	2	3	4	5
1. Discrimination intent at work	-	.33**	.41**	.38**	.57**
2. Prejudiced attitudes	.24**	-	.50**	.47**	.56**
3. Good care for HIV patients	.41**	.45**	-	.33**	.45**
4. Internalized shame	.48**	.41**	.38**	-	.78**
5. Fear of PLWHA	.49**	.47**	.34**	.63**	-

Correlations among CFA development sample below the diagonal; correlations among validation sample (EFA sample) above the diagonal