Measuring HIV- and TB-related stigma among health care workers in South Africa: a validation and reliability study

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_____ S U M M A R Y

SETTING: Recent evidence indicates that human immunodeficiency virus (HIV) and tuberculosis (TB) related stigma act as a key barrier to the utilisation of associated occupational health services by South African health care workers (HCWs). It also highlights a dearth of appropriate tools to measure HIV and TB stigma among HCWs.

OBJECTIVE: To test four scales measuring different aspects of stigma: respondent's external stigma (RES) and others' external stigma (OES) towards TB as well as HIV across different professional categories of HCWs.

DESIGN: The current study employs data from a study on HIV and TB stigma among HCWs, a cluster randomised controlled trial for the collection of data among 882 HCWs in the Free State Province of South Africa. Confirmatory factor analyses and structural equation modelling were used to assess the validity and reliability of the scales.

RESULTS: All four scales displayed adequate internal construct validity. Subsequent analysis demonstrated that all four scales were metric-invariant, and that the OES scales were even scalar-invariant across patient and support staff groups. The scales displayed good reliability and external construct validity.

CONCLUSION: Our results support the use of the scales developed to measure TB and HIV stigma among HCWs. Further research is, however, needed to fine tune the instruments and test them across different resource-limited countries.

KEY WORDS: stigma; South Africa; HCWs; reliability; validity

THE DEADLY human immunodeficiency virus (HIV) and tuberculosis (TB) co-epidemic has had a severe impact on South Africa and its health system.[1] With 7.0 million South Africans living with HIV, the country has the world's highest number of infected people.[2] South Africa also has one of the most severe TB epidemics in the world: in 2015, South Africa had the highest incidence of TB (834 per 100 000 population) and 19 613 reported cases of rifampicin- or multidrug-resistant (MDR) TB.[3] In addition, both epidemics are intricately intertwined, with approximately 73% of new TB cases co-infected with HIV.[4]

Apart from the massive burden of disease and the subsequent workload for an already crippled health system,[5–7] the co-epidemic is also affecting the health care workforce. Occupational exposure to TB constitutes a major health risk for health care workers (HCWs): large patient numbers and the resulting overcrowded health facilities, combined with poorly implemented infection control strategies, render HCWs three times more likely to acquire TB than the general population.[8–10] TB is thus officially classified as an occupational disease. The HIV epidemic also affects the workforce because of the mutually reinforcing epidemiology of HIV and TB: estimates of HIV prevalence among South African HCWs range from 11.5% to 20.0%.[11]

Recent evidence has demonstrated that providing HIV and TB services to HCWs at work is cost-effective, and is preferred by the majority of HCWs.[12,13] Workplace health services for TB and HIV/AIDS (acquired immune-deficiency syndrome) are thus an essential part of any strategy for the strengthening of health systems.[14] However, a review paper has demonstrated that HIV- and TB-related stigma and discrimination are the key barriers to the use of these services and thus to the success of workplace health programmes.[15] This renders the development and testing of stigma-reduction interventions among HCWs a clear research priority.

A first step towards such a stigma-reduction intervention is the development and testing of

appropriate tools to measure both HIV and TB stigma among the health care workforce (towards HCWs, not patients), as there are currently very few HIV and TB stigma-measurement scales that specifically target people working in the health system. The only available tools—published recently by Wouters et al.—have been tested only in a small sample of HCWs, and did not include multiple group testing to account for different outcomes across different professional categories.[16] The current validation study aims to address these shortcomings by testing a range of scales measuring different aspects of stigma: the respondent's and colleagues' external stigma towards TB as well as HIV across different professional categories working in the health care setting.

METHODS

The present study employed the baseline data of a cluster randomised controlled trial—Towards a health-enabling working environment: developing and testing interactions to decrease HIV and TB sitgma among health care workers in the Free State, South Africa—aimed at reducing levels of HIV and TB stigma among HCWs in the Free State Province of South Africa. The study protocol was approved by the Ethics Committee of the Faculty of Health Science of the University of the Free State, Bloemfontein, South Africa (ECUFS 55/2015).

The study aims to scientifically assess the extent and sources of HIV- and TB-related stigma among HCWs and to develop and test evidence-based stigma-reduction interventions. For this goal, a random sample of 882 HCWs—both patient staff (i.e., doctors, nurses; 446) and support staff (i.e., messengers, cleaners, administrative staff; $n = 436$) working in eight hospitals in the Free State—was drawn from the health care workforce register. For each hospital, HCWs were categorised separately according to professional group (support, management and administration, doctors, nurses, and allied). A list of random numbers was generated to sample HCWs proportionate to size so that each group was represented. In total, 24.0% of HCWs were not able to participate (no longer working there, unavailable, refused participation) and had to be replaced by a random selection of HCWs with similar profiles (hospital and professional category). After obtaining written informed consent from all participants, trained field workers provided participants with standard questionnaires that were completed in a self-administered process.

Measures

The questionnaire contained four stigma scales that had been previously piloted in a small sample and reported by Wouters et al.:[16] 1) the Others' External

Stigma (OES) scales measure perceptions, attitudes and behaviours that respondents witness being enacted, or perceive as existing, among other HCWs (referred to also as 'colleagues') in the hospital (scale 1 = HIVOES; scale 2 = TBOES); and 2) the Respondent's External Stigma (RES) scales measure respondents' perceptions, attitudes and behaviours towards other HCWs in the hospital (scale 3 = HIVRES; scale 4 = TBRES).

The outcomes of the pilot study were used to minimise the number of items per stigma subscale, as the HCWs' time was limited. Apart from the four stigma scales (listed in Table 1) to be tested, the survey included a series of sociodemographic questions (age, sex, occupation, education). The pilot study also assessed HIV- (10 items) and TB-related knowledge (10 items) among HCWs, as studies have repeatedly shown a negative association between knowledge and stigma.[17,18] Finally, previous research clearly indicates that stigma and confidentiality are associated.[15,19,20] The survey thus included a series of questions on confidentiality in the workplace (e.g., 'do you think confidentiality is maintained in your occupational health unit?').

Data analysis

Our analytical strategy consisted of the following four steps: 1) confirmatory factor analysis (CFA) testing for internal construct validity, 2) reliability testing (Cronbach's α), 3) testing of configural, metric and scalar invariance across the two subgroups (patient staff and support staff) using differences in χ^2, and 4) structural equation modelling to test for external construct validity (correlations between stigma scales and with TB and HIV knowledge and confidentiality). The full analytical strategy is explained in the Appendix.* All analyses were performed using MPlus v7.4 (Muthén & Muthén, Los Angeles, CA, USA).

RESULTS

Population characteristics and presentation of the items

The characteristics of our population are given in Table 2. Table 1 shows the different items ascribed to the different stigma scales, as well as the spread of HCW responses.

Confirmatory factor analyses: internal construct validity

A series of CFAs was executed to assess the internal construct validity of the four scales. Table 1 shows the

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Table 1   Four stigma scales,* factor loadings, reliability estimate and goodness-of-fit indices (*n* = 882, except for HIVOES, *n* = 881)

	Standardised loading	Mean ± SD
HIVOES (α = 0.792)		
Some of my co-workers in this hospital look down on HCWs who they think may be HIV-infected	0.706	1.99 ± 0.801
There are HCWs who make negative remarks about the health of co-workers who are involved in HIV care and treatment	0.688	2.13 ± 0.825
Some HCWs who are suspected of having HIV are rejected by others in the workplace	0.716	1.99 ± 0.737
Other HCWs in this hospital are afraid of catching HIV from colleagues who care for HIV-positive patients	0.681	2.05 ± 0.805
HIVRES (α = 0.783)		
I would feel comfortable having HCWs who are known to be HIV-positive working closely with me in my job	0.524	1.87 ± 0.775
HCWs who have HIV should not feel guilty about it	0.736	1.65 ± 0.755
HIV-positive HCWs can be good role models in the workplace	0.757	1.61 ± 0.701
Doctors and nurses with HIV who are otherwise in good health should continue practising medicine	0.727	1.50 ± 0.633
TBOES (α = 0.841)		
HCWs who are suspected of having TB are stigmatised in this hospital	0.749	1.98 ± 0.741
Some HCWs in this hospital avoid contact with co-workers who they think may have TB	0.812	1.96 ± 0.715
Some HCWs in this hospital would not want to eat or drink with a co-worker who they think has TB	0.674	2.12 ± 0.843
Some HCWs in this hospital are stigmatised when others find out that they have undergone TB screening	0.632	2.00 ± 0.765
I have noticed that some other HCWs in this hospital feel uncomfortable to work near co-workers with TB	0.710	2.92 ± 0.808
TBRES (α = 0.657)		
I do not want to work together with co-workers who are on anti-tuberculosis treatment	0.682	1.70 ± 0.677
I am cautious of co-workers who are on anti-tuberculosis treatment	0.374	2.31 ± 0.807
If I think a co-worker has TB, I will avoid eating or drinking in the same room	0.788	1.80 ± 0.666

	SRMR	RMSEA	CFI	TLI
HIVOES	0.038	0.142	0.919	0.757
HIVRES	0.012	0.034	0.995	0.984
TBOES	0.031	0.084	0.958	0.916
TBRES	0	0	1	1

* All items were rated on a four-point Likert scale (totally agree, agree, disagree, totally disagree).
HIVOES = others' stigmatising attitudes, perceptions and behaviours towards HIV; SD = standard deviation; HCW = health care worker; HIV = human immunodeficiency virus; HIVRES = respondent's stigma towards HIV; TB = tuberculosis; TBOES = others' stigmatising attitudes, perceptions and behaviours towards TB; TBRES = respondent's stigma towards TB; SRMR = standardised root mean square residual; RMSEA = root mean square error of approximation; CFI = Confirmatory Fit Index; TLI = Tucker-Lewis Index.

Table 2   Sample descriptors

	n (%)
Sex	
Male	249 (28.3)
Female	631 (71.7)
Age	875
	(mean age 43.62 years ± SD 9.9)
Education level	
None	4 (0.5)
Primary	48 (5.4)
Secondary	154 (17.5)
Matric	306 (34.7)
Diploma	240 (27.2)
Degree	130 (14.7)
Race	
Black	774 (87.8)
Coloured	34 (3.9)
White	70 (7.9)
Asian	4 (0.5)
Years working in the hospital	882
	(mean 11.64 years ± SD 9.6)
Professional group	
Patient care	446 (50.7)
Support staff	434 (49.3)

SD = standard deviation.

factor loadings of the different items onto the different theory-based scales.

The original model measuring the respondents' stigma towards HIV (HIVRES) comprised five items but did not fit the data well. One item ('I would feel comfortable being close friends with a health care worker who is known to be HIV-positive') also did not load well onto the factor ($\lambda = 0.372$). When we deleted this item, the factor with four items fitted the data well (root mean square error of approximation [RMSEA] = 0.034; Confirmatory Fit Index [CFI] = 0.995; Tucker-Lewis Index [TLI] = 0.984; standardised root mean square residual [SRMR] = 0.012), whereas all items loaded well onto this factor. The scale measuring colleagues' stigmatising attitudes, perceptions and behaviours towards HIV (HIVOES) yielded a borderline fit, with SRMR demonstrating a good fit (0.038) and the CFI (0.919) suggesting an acceptable fit; however, the RMSEA (0.142) and TLI (0.757) were a poor fit. The CFA, however, displayed

Table 3 Invariance model comparisons for the four stigma scales ($n = 882$, except for HIVOES $n = 881$)

	χ^2	df	CFI	TLI	RMSEA	SRMR
HIVOES						
M1: configural invariance	40.587	4	0.915	0.744	0.144	0.041
M2: metric invariance	41.665	7	0.919	0.861	0.106	0.045
M3: scalar invariance	50.004	10	0.907	0.888	0.095	0.050
	$\Delta\chi^2$	Δdf	P value			
M1 vs. M2	2.540	3	0.468			
M2 vs. M3	4.297	3	0.231			
HIVRES						
M1: configural invariance	6.279	4	0.994	0.982	0.036	0.014
M2: metric invariance	8.208	7	0.997	0.994	0.020	0.025
M3: scalar invariance	18.204	10	0.978	0.974	0.043	0.027
	$\Delta\chi^2$	Δdf	P value			
M1 vs. M2	1.842	3	0.606			
M2 vs. M3	11.315	3	0.011			
TBOES						
M1: configural invariance	44.581	10	0.953	0.907	0.089	0.034
M2: metric invariance	49.809	14	0.952	0.931	0.076	0.035
M3: scalar invariance	65.888	18	0.936	0.928	0.078	0.041
	$\Delta\chi^2$	Δdf	P value			
M1 vs. M2	0.721	4	0.949			
M2 vs. M3	17.071	4	0.002			
TBRES						
M1: configural invariance	0	0	1	1	0	0
M2: metric invariance	4.325	2	0.985	0.954	0.051	0.041
M3: scalar invariance	15.006	4	0.927	0.891	0.079	0.068
	$\Delta\chi^2$	Δdf	P value			
M1 vs. M2	4.325	2	0.115			
M2 vs. M3	12.621	2	0.002			

HIVOES = others' stigmatising attitudes, perceptions and behaviours towards human immunodeficiency virus; df = degrees of freedom; CFI = Confirmatory Fit Index; TLI = Tucker-Lewis Index; RMSEA = root mean square error of approximation; SRMR = standardised root mean square residual; HIVRES = respondent's stigma towards HIV; TBOES = others' stigmatising attitudes, perceptions and behaviours towards TB; TBRES = respondent's stigma towards TB; HIV = human immunodeficiency virus; TB = tuberculosis.

sufficiently high loadings of the four items onto the factor.

The first TB scale assessed the respondent's stigma towards TB using only three items (TBRES). This caused the model to be just identified, resulting in an inability to assess the model fit. Two items loaded well onto the factor, but the third item ('I am cautious of co-workers who are on TB treatment') did not sufficiently load onto the factor ($\lambda = 0.374$). Deleting this item, however, would result in a model that was under-identified. The model testing the scale for measuring stigmatising attitudes towards TB among HCWs in the respondent's entourage (TBOES) displayed an acceptable fit to the data. The factor loadings indicated that all five items loaded well onto the factor.

Scale reliability

The resulting factors were subjected to a reliability analysis (Table 1). All but one of the final scales displayed good reliability (Cronbach's $\alpha > 0.7$). As expected, the three-item factor TBRES only produced a Cronbach's α of 0.657.

Multiple-group confirmatory factor analyses

Second, multiple-group CFAs were used to examine the extent to which properties and interpretations of the stigma scores generalised across the two selected professional groups: patient staff and support staff (Table 3).

In a first step, configural invariance was tested. The fit of the four models was generally satisfactory: only the HIVOES scale displayed a borderline fit. All factor loadings were >0.4, except for one item ('I am cautious of co-workers who are on TB treatment') of the REXT-TB scale that had a loading of 0.445 in the medical staff group, but only 0.256 in the support staff group. It can thus be concluded that the four scales exhibited configural invariance across the two professional groups, i.e., each stigma scale was associated with identical item sets across the two groups.

After configural invariance had been established, testing for metric invariance was conducted using a χ^2 difference ($\Delta\chi^2$) test for two nested models. The four metric-invariant models displayed an acceptable fit. More importantly, the increase in χ^2 was not significant for each of the four scales, indicating invariance of the factor loadings across the two groups. Hence, this level of invariance provided evidence that the corresponding common factors had the same meaning across groups.

In a final step, testing for scalar invariance, equal

Table 4 Estimated correlation matrix of latent constructs (HIVOES, TBOES, HIVRES and TBRES; n = 881)

	HIVOES	HIVRES	TBOES	TBRES
Group: patient care				
HIVOES		0.157*	0.830†	0.511†
HIVRES			0.198†	0.360†
TBOES				0.705†
Group: others				
HIVOES		−0.038	0.789†	0.531†
HIVRES			−0.022	0.125
TBOES				0.705†

* P < 0.05.
† P < 0.001.
HIVOES = others' stigmatising attitudes, perceptions and behaviours towards HIV; TBOES = others' stigmatising attitudes, perceptions and behaviours towards TB; HIVRES = respondent's stigma towards HIV; TBRES = respondent's stigma towards TB; HIV = human immunodeficiency virus; TB = tuberculosis.

factor loadings and equal indicator intercepts (i.e., indicator means) across groups are required. All four models displayed a satisfactory fit to the data (with the exception of the HIVOES scale, where the fit indices displayed a mixed pattern). The additional restriction did not result in a significant increase in χ^2 for both OES scales—measuring the perceived stigmatising attitudes of the co-workers—indicating that the error variances of items loading on the same factor were identical. We can thus compare the latent means of the HIVOES and TBOES scales across the two professional groups. The restriction, however, did result in a significant increase in χ^2 for both RES scales, meaning that the two scales are not fully scalar invariant across the two groups and that we could not compare the latent means across the groups.

Structural equation modelling: external construct validity

First, we looked at the correlations between the different types of stigma (Table 4). Across both

Table 5 Structural equation models testing the correlations between the various stigma scales and 1) confidentiality, 2) HIV knowledge and 3) TB knowledge—each time controlled for the impact of age, gender and education (n = 869)

	HIVOES	HIVRES	TBOES	TBRES
Confidentiality				
Patient care	0.326*	0.047	0.277*	0.130†
Others	0.204*	−0.049	0.180†	0.195‡
Knowledge				
HIV knowledge				
Patient care	−0.104†	−0.108	−0.056	−0.074
Others	−0.075	−0.110†	−0.089	−0.150†
TB knowledge				
Patient care	−0.176*	−0.164*	−0.155*	−0.185*
Others	0.011	−0.043	0.008	−0.108†

* P < 0.001.
† P < 0.05.
‡ P < 0.01.
HIV = human immunodeficiency virus; TB = tuberculosis; HIVOES = others' stigmatising attitudes, perceptions and behaviours towards HIV; TBOES = others' stigmatising attitudes, perceptions and behaviours towards TB; HIVRES = respondent's stigma towards HIV; TBRES = respondent's stigma towards TB.

groups, we observed moderate-to-strong correlations between HIVOES and TBOES and between TBRES and TBOES. To test the external construct validity of the four scales across the two groups, we tested a series of structural equation models (SEMs; Table 5). In each model, we controlled for age, sex and education. As hypothesised, the level of confidentiality weakly (but significantly) correlated with the respondent's perception of their colleagues' stigmatising attitudes (TBOES and HIVOES), thereby supporting our claim that the developed scales measured what they were designed to measure. The SEMs also supported the external construct validity of scales measuring the respondent's own stigmatising attitudes (TBRES and HIVRES), as these scales correlated weakly (but significantly) with their respective knowledge scores. Only the correlation between the HIVRES scale and HIV knowledge among the patient staff was not significant (P = 0.065).

DISCUSSION

There is a dearth of validated HIV and TB stigma scales that explicitly target different HCW groups. Measuring a complex construct, such as HIV or TB stigma, in this subpopulation is complex, and requires sufficient attention to be paid to the validity and reliability of applied instruments. We wished to validate and test the psychometric properties of a series of measures of HIV and TB stigma in a health care setting.

The results of the CFAs demonstrated that the four scales measuring external stigma towards HIV (1) and TB (2) among colleagues and the external stigma towards HIV (3) and (4) among respondents displayed acceptable internal construct validity. Multiple group analyses demonstrated that all scales were metric-invariant across the two professional groups, indicating that stigma constructs had the same meaning across groups; quantitative group comparisons of estimated factor variances and covariances were therefore defensible.[21,22] Two scales were scalar-invariant, allowing for defensible group comparisons of both observed and factor means as well as factor variances and covariances.[21,22]

The strong correlation—across both professional groups—between the two OES stigma scales provides evidence of the existence of a double stigma, as theoretically developed by Daftary.[23] We assessed the external construct validity of the four scales by testing a series of SEMs. In accordance with previous studies,[15,16,20] the respondent's perceptions of their colleagues' externalising stigma (OES) was negatively correlated with the level of perceived confidentiality in the hospital. These results support the external construct validity of the scales, as they are in accordance with those of a recent study by Kahn et al., which identified a clear relationship between

perceived stigma levels, perceived confidentiality in the facility and the uptake of occupational health services.[24] As demonstrated previously, knowledge about TB and HIV negatively correlated with the respondents' own stigmatising attitudes, supporting the external construct validity of the TBRES and HIVRES scales.[17,25,26]

The results and implications of the present study should be interpreted in view of its two main limitations. First, the scales employed in this validation study were developed to be as concise as possible to make them suitable for inclusion in large-scale studies, which usually explore a wide range of concepts and thus have limited space for each individual concept. This has resulted in scales consisting of only three items, leading to just-identified CFA models, the inability to drop items with low loadings and the borderline fit of some of the models. Second, our study should be considered as the first step in the development and testing of a series of parallel scales measuring the stigmatising attitudes among HCWs towards HIV and TB in South Africa. Results may not be generalisable to alternative settings, thereby necessitating further work on these instruments in other facilities and regions.

The use of appropriate scales is a crucial element in research designed to develop and test interventions for the reduction of HIV and TB stigma in health care settings. The current study pushed the boundaries of current knowledge by rigorously testing four parallel scales measuring TB and HIV stigma in a health care setting. Our study aims to enable future studies to further validate the scales and, if successful, employ these scales to 1) identify which type of stigma hampers the use of occupational health services, 2) develop appropriate stigma-reduction interventions and 3) assess the impact of these interventions by comparing the factor scores of scalar-invariant scales over time.

Acknowledgements

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APPENDIX

Information on the measurement of HIV and TB knowledge and confidentiality

Knowledge about the human immunodeficiency virus

Knowledge about the human immunodeficiency virus (HIV) was measured using 10 questions; answer categories were 'yes', 'no' and 'not sure'. Scores were added to compute a score ranging from 0 (no knowledge) to 10 (perfect knowledge).

1. Can people reduce their risk of HIV infection by using a condom every time they have sex?
2. Can HIV or AIDS (acquired immune-deficiency syndrome) be cured?
3. Is it possible to cure tuberculosis (TB) in people with HIV?
4. Is a person with HIV more likely to get TB?
5. Does antiretroviral treatment make HIV-positive people less infectious?
6. Can the HIV virus ever be transmitted from a mother to a child in the womb?
7. Is the risk of HIV transmission following needle-prick or sharps injuries very small (under 0.4% risk)?
8. Should all HIV-positive women use formula feeding only for their babies?
9. Does medical male circumcision help prevent HIV-positive men from transmitting HIV?
10. Will all people who are taking antiretroviral drugs eventually develop resistance?

Knowledge about tuberculosis

Knowledge about TB was measured using 10 questions; answer categories were 'yes', 'no' and 'not sure'. Scores were added to compute a score ranging from 0 (no knowledge) to 10 (perfect knowledge).

1. Are the following symptoms used to diagnose TB?
   i. Cough for >2 weeks
   ii. Unintentional weight loss
   iii. Fever for >1 week
   iv. Night sweats
   v. Nausea
2. Should TB be treated for at least 6 months?
3. Should at least four drugs be used to treat TB?
4. Do people with TB usually become less infectious within 3 weeks after initiating appropriate treatment?
5. Can people with multidrug-resistant TB be cured within 12 months?
6. Can HIV-positive health care workers (HCWs) be protected from tuberculous infection by undergoing isoniazid prophylaxis treatment?

Confidentiality

Confidentiality was measured using five questions; answering categories were 'yes', 'no' and 'not sure' (except for question 1, which only had 'yes' and 'no' answers):

1. Since you have been working at your current hospital, have you been taught about protecting the confidentiality of the HIV status of co-workers (HCWs)?
2. In your hospital is there a code of conduct (formal set of guidelines) in place for dealing with wrongful disclosure of a HCW's health information?
3. Do you think that confidentiality about HIV is maintained in your Occupational Health Unit (Sick Bay)?
4. Do you think that confidentiality about TB is maintained in your Occupational Health Unit (Sick Bay)?
5. Do you think that confidentiality about general health-related issues is maintained in your Occupational Health Unit (Sick Bay)?

Analytical strategy

In a first step, and as a theory-testing model, internal construct validity was assessed using a series of separate confirmatory factor analyses (CFAs). For each of the four stigma scales, we removed items that did not successfully load (<0.40) onto the theoretical stigma domain.[1,2] The fit indices used were the Tucker-Lewis Index (TLI), the comparative fit index (CFI), the root mean square error of approximation (RMSEA) and the standardized root mean square residual (SRMR).

Following the recommendations of Hu and Bentler, two of the following three criteria had to be met for satisfactory global model fit to be attained: CFI/TLI ≥0.95, RMSEA ≤0.06, and SRMR ≤0.08.[3] Other methodologists have proposed that RMSEA values <0.08 suggest an adequate model fit,[4] and CFI and TLI values of 0.90–0.95 are indicative of an acceptable model fit.[1,2]

Second, the reliability of the different stigma scales was measured using Cronbach's α coefficient (internal consistency). For a stigma scale to be considered consistent, the value of the coefficient must be >0.7.[5]

In a third step, we tested whether the four stigma scales had the same meaning for each professional group—patient staff (i.e., all staff directly working with patients) and support staff (administrative and supportive staff, including cleaners, clerks, etc.). This question was addressed by testing for factorial invariance—1) configural, 2) measurement and 3) scalar invariance—of the targeted construct across the two groups. Configural invariance required that stigma factors be associated with the same items

across the two groups. Metric invariance required the corresponding factor loadings to be equal across groups, testing whether common factors had the same meaning across the groups. The final step (scalar invariance) required equal item intercepts across the groups. Where the lack of scalar invariance signals the presence of item bias (or differential item functioning), its presence states that comparison of factor means across groups is possible.[6,7] The restrictions for equality of specific parameters across groups were imposed one by one, thus producing nested models that were tested against each other using χ^2 difference testing.

Finally, we tested correlations between the different stigma scales to assess the interrelationships between scales, as well as their ability to differentiate between the different types of HIV- and TB-related stigma. We expected the TBOES and HIVOES scales to be positively correlated with the respondent's external stigmatising perceptions, attitudes and behaviours (HIVRES and TBRES), as past experiences of external stigma such as blame, rejection, intimidation, name-calling, exclusion and isolation have been shown to influence the respondents' own stigmatising perceptions, attitudes and behaviour.[8] External construct validity was investigated by assessing the relationship between the different stigma subscales and relevant correlates: 1) HIV- and TB-related knowledge and 2) the level of confidentiality in the workplace, using structural equation modelling.[9,10] Based upon the literature,[11,12] we expected the stigma scales (HIVOES and TBOES) assessing stigmatisation by others to be negatively correlated with the level of confidentiality, as a breach in confidentiality can be a proxy for stigmatising behaviour in the workplace. We expected the respondent's external stigmatising perceptions, attitudes and behaviours (HIVRES and TBRES) to be negatively correlated with his/her knowledge of the disease, as this relationship has been reported repeatedly.[13–15] However, the workforce interviewed was rather diverse, necessitating us to assess these relationships while controlling for the age and gender of the respondent, his/her role in the facility and the level of education achieved.

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RÉSUMÉ

CONTEXTE : Des éléments récents indiquent que la stigmatisation liée au virus de l'immunodéficience humaine (VIH) et à la tuberculose (TB) constitue un obstacle majeur à l'utilisation des services de médecine du travail par le personnel de santé (HCW) d'Afrique du Sud. Ceci met également en lumière un manque d'outils appropriés destinés à mesurer la stigmatisation liée au VIH et à la TB parmi les HCW.

OBJECTIF : Tester quatre échelles de mesure des différents aspects de la stigmatisation—la stigmatisation extérieure des répondants (RES) et la stigmatisation extérieure d'autres personnes (OES) vis-à-vis de la TB ainsi que du VIH—dans différentes catégories professionnelles de HCW.

SCHÉMA : L'étude actuelle recourt aux données d'un essai randomisé contrôlé en groupes rassemblant les données de 882 HCW dans l'état libre d'Orange en Afrique du Sud. Les analyses factorielles de confirmation et la modélisation par équation structurelle ont été utilisées afin d'évaluer la validité et la fiabilité des échelles.

RÉSULTATS : Les quatre échelles ont montré une validité suffisante en termes de structure interne. L'analyse ultérieure a démontré que les quatre échelles présentaient une invariance métrique et les échelles OES même une invariance d'échelle à travers les groupes de patients et de personnel de soutien. Les échelles ont démontré une bonne fiabilité et validité de structure externe.

CONCLUSION : Les résultats soutiennent l'utilisation des échelles développées comme méthode de mesure de la stigmatisation vis-à-vis de la TB et du VIH parmi les HCW. Davantage de recherche est cependant nécessaire pour affiner les instruments et les tester dans différents pays à ressources limitées.

RESUMEN

MARCO DE REFERENCIA: Pruebas científicas recientes indican que la estigmatización asociada con la infección por el virus de la inmunodeficiencia humana (VIH) y la tuberculosis (TB) constituye un obstáculo central a la utilización de los servicios de medicina del trabajo conexos por parte del personal sanitario (HCW) en Suráfrica. La situación pone de relieve además la carencia de instrumentos adecuados que permitan medir el grado de estigmatización relacionada con estas dos afecciones en los HCW.

OBJETIVO: Ensayar cuatro escalas que miden aspectos diferentes de la estigmatización asociada con la TB y la infección por el VIH (los estigmas externos de las personas que responden a las preguntas [RES] y los estigmas externos que estas personas perciben en los demás [OES]), en diferentes categorías de HCW.

MÉTODO: En la presente investigación se utilizaron datos de un estudio comparativo aleatorizado por conglomerados que recoge datos de 882 HCW en la provincia del Estado Libre de Suráfrica. Se aplicaron modelos de ecuaciones estructurales con análisis factoriales confirmatorios a fin de evaluar la validez y la fiabilidad de las escalas.

RESULTADOS: Las cuatro escalas ofrecieron una adecuada validez interna del constructo. Los análisis siguientes demostraron que las cuatro escalas presentaban invarianza métrica y las escalas sobre los estigmas percibidos exhibieron incluso invarianza de escala, cuando se utilizaban en diferentes grupos de HCW y personal auxiliar. Se observó una adecuada fiabilidad y validez externa del constructo de las escalas.

CONCLUSIÓN: Los resultados del estudio respaldan la utilización de las escalas elaboradas como método de medición de la estigmatización asociada con la TB y la infección por el VIH en los HCW. No obstante, se precisan nuevas investigaciones que afinen estos instrumentos y los pongan a prueba en diferentes países con recursos limitados.