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Comparative stigma of HIV/AIDS, SARS, and Tuberculosis in Hong Kong

Winnie W.S. Mak*, Phoenix K.H. Mo, Rebecca Y.M. Cheung, Jean Woo, Fanny M. Cheung, Dominic Lee

The Chinese University of Hong Kong Shatin, NT, Hong Kong

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Abstract

This study compares public stigma towards three types of infectious diseases— human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS), severe acute respiratory syndrome (SARS), and tuberculosis (TB)—tests an attribution model of stigma, and explores the relationships between stigma and public attitudes towards government policies in Hong Kong. Using a population-based telephone survey, 3011 Hong Kong Chinese adults were randomly assigned to one of the three disease conditions and were interviewed about their attitudes and beliefs towards the assigned disease. Findings showed that public stigma was the highest towards HIV/AIDS, followed by TB and SARS. Using multi-sample model structural equation modeling, we found that the attributions of controllability, personal responsibility, and blame were applicable in explaining stigma across three disease types. Knowledge about the disease had no significant effect on stigma. Participants with less stigmatizing views had significantly more favorable attitudes towards government policies related to the diseases. The study is an important attempt in understanding the attributional mechanisms of stigma towards infectious diseases. Implications for stigma reduction and promotion of public awareness and disease prevention are discussed.

Keywords: Attribution; HIV/AIDS; SARS; Tuberculosis; Hong Kong; Stigma

Introduction

Despite remarkable breakthroughs in modern medicine to eradicate pandemic diseases, infectious diseases remain the leading cause of death and continue to be a growing threat across the globe (National Institutes of Allergy and Infectious Diseases, 1998; World Heath Organization, 1998; World Health Organization, 2002). Among the various infectious diseases, human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS), severe acute respiratory syndrome (SARS), and tuberculosis (TB) are important public health concerns in Hong Kong. Although their means of infection and disease course differ, they pose a health threat to the general public and are issues of concern for public health professionals in terms of preventing their spread, promoting public awareness, and educating the public about the diseases.

*Corresponding author. Tel.: +852 2609 6577; fax: +852 2603 5019.

E-mail addresses: wwsmak@psy.cuhk.edu.hk (W.W.S. Mak), phoenixmo@gmail.com (P.K.H. Mo), ymcheung@psy.cuhk.edu.hk (R.Y.M. Cheung), jeanwoowong@cuhk.edu.hk (J. Woo), fmcheung@cuhk.edu.hk (F.M. Cheung), dominiclee@cuhk.edu.hk (D. Lee).

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Stigma of infectious diseases

In view of the chance of spread and subsequent protracted physical and psychological morbidity and mortality, those with infectious diseases are known to be stigmatized (Goffman, 1963; Lau et al., 2005; Link & Phelan, 2001; Malcolm et al., 1998;). Among various infectious diseases, the stigma attached to HIV/AIDS has been the most blatant and widely studied (Crawford, 1996). Over the decades, evidence has shown that individuals with or being suspected of having HIV/AIDS have been denied health care services and employment, refused entry to foreign countries, shunned by neighbors and co-workers, and experienced social disruptions with family members and friends (Crandall & Coleman, 1992; Herek, 1999). Stigmatization towards individuals with TB has also been reported. Infected individuals are often regarded as dirty and their level of contagiousness is greatly exaggerated (Yamada, Caballero, Matsunaga, Agustin, & Magana, 1999). Fear and isolation of individuals with TB is common, even among their families and friends (Jaramillo, 1999; Kelly, 1999). Besides HIV/AIDS and TB, stigma towards other infectious diseases such as SARS (Lee, Chan, Chau, Kwok, & Kleinman, 2005), syphilis (Whitty, 1999), and genital herpes (Breitkopf, 2004; Fortenberry, 2004) has also been documented. Generally speaking, stigma of infectious diseases can be as devastating to the infected individuals as the diseases themselves.

Disease-related stigmatization not only poses detrimental consequences for the quality of life of the affected individuals, it also affects public attitudes towards prevention and research priorities, service provision, and issuance of related health policies. Such attitudinal effects may impact resource allocation and direction of public health planning (Gilmore & Somerville, 1994; Goldin, 1994; Herek, Capitanio, & Widaman, 2003). In other words, illness perceptions and perceived risks of infection can play an important role, sometimes more so than the actual disease itself, in shaping public responses to health care policies (Burris, 2000). Previous studies have used some of these illness perceptions, including controllability, internality, behavioral causality, responsibility, blame, infection risk, severity, and incurability (Bos, Kok, & Dijker, 2001; Crandall & Moriarty, 1995; Dijker, Kok, & Koomen, 1996; Peters, den Boer, Kok, & Schaalma, 1994) to understand stigma towards AIDS and other physical diseases. Extending from this line of research, the present study used an attribution model to compare public stigma towards HIV/AIDS, SARS, and TB, and examined the effects of stigma on policy attitudes among the general public in Hong Kong.

Incidence of HIV/AIDS, SARS, and TB

Among the three types of infectious diseases, TB has the longest history. It has the highest incidence rate in South-East Asia (33% of all incidence cases) (World Health Organization, 2005) and remains the major cause of death (95% of death cases) among notifiable infectious diseases in Hong Kong (Hong Kong Hospital Authority, 2002). In recent years, there has been a resurgence of TB in Hong Kong due to various social trends, such as the aging of the general population, the emergence of drug resistant strains, and the increasing number of HIV-related TB cases (Hong Kong Tuberculosis and Chest Service, 2002).

On the other hand, SARS has the shortest history among the three types of infectious diseases with the recent outbreak in 2003. The unprecedented SARS outbreak was reported in 29 areas and affected more than 8000 people, resulting in 774 deaths. Hong Kong was one of the most severely affected areas, with 1755 cases and 299 deaths reported (World Health Organization, 2003). During the peak of the epidemic, patients were quarantined in hospital wards. The entire Block E of Amoy Garden, a private residential complex in the community in which more than 90 SARS cases were reported, had to be evacuated and disinfected. All of its residents were segregated for 10 days to prevent further spread of the disease. All schools in Hong Kong were suspended for an entire month in April 2003 (Hong Kong SARS Expert Committee, 2003).

Compared to TB and SARS, HIV/AIDS has had a moderate developmental history. First recognized a little over three decades ago, it swiftly received public health attention due to its lethality. In Hong Kong, the introduction of highly active anti-retroviral therapies (HAART) has transformed the disease to a chronic illness. Since 1996, the number of AIDS cases has consistently declined, resulting in the lowest number of cases in 2004 (Hong Kong Centre for Health Protection, 2005). Nevertheless, the number of HIV infections in Hong Kong has reached its highest point ever reported in the same year. Despite the promising results in counteracting

AIDS, HIV infection continues to be a primary public health concern in Hong Kong. In light of public health efforts in preventing the transmission of the three infectious diseases, the aim of the present study was to examine and compare public's views towards these diseases and identify possible social cognitive correlates related to their stigma.

Attribution model of stigma

Research on the mechanisms of stigma can serve as a guide to the development of anti-stigma programs and public health interventions. Currently, most of the public education programs focus on dissemination of knowledge, with the view that enhanced knowledge about a disease can reduce public bias against the disease. However, most of the research findings indicated that instilling knowledge is insufficient to produce attitude change (Brown, Macintyre, & Trujillo, 2003; Corrigan et al., 2001; Hayes, Vaughan, Medeiros, & Dubuque, 2002). Rather, specific cognitive and emotional representations of the disease must be targeted and changed in order to reduce public stigma towards that disease (Corrigan & Penn, 1999).

Based on the attribution theory (Weiner, 1993), individuals' assignment of the cause of the disease can affect their affective and behavioral responses towards the disease carriers. Among different attributions, controllability was found to be strongly associated with stigma (Corrigan, 2000; Weiner, Perry, & Magnusson, 1988). When the public regards contraction of the disease to be controllable by the individuals, the public is more likely to hold the infected individuals to be responsible for their own illness. Hence, the public is more likely to blame the individuals and reject them from society (Corrigan et al., 2000; Corrigan, Markowitz, Watson, Rowan, & Kubiak, 2003). Support of such attributional pathway has been found in psychiatric stigma (Corrigan, 2000). However, this chain has yet to be tested on stigma towards infectious diseases. To examine comprehensively the attribution model of stigma towards infectious diseases, the present study tested the pathway of controllability, responsibility, and blame to stigma among the general public in Hong Kong. We hypothesized that people who attributed the control of contracting the disease to be internal to the individuals are likely to assign greater level of personal responsibility to these individuals, and would be more likely to blame them and attach greater stigma to them.

Stigma and government policies

In addition to comparing public stigma of the three infectious diseases and exploring the attributional pathway to stigma, another aim of this study was to examine the relations between stigma and policy attitudes of the general public. Research on public views of HIV/AIDS has shown that AIDS-related stigma shaped public attitude towards HIV Surveillance Policy (Herek & Capitanio, 1993; Herek et al., 2003). Although public health resource allocation should be commensurate with public health needs, the surge of epidemics in Hong Kong indicated that public health resources might not be prioritized to the most pressing public health problems due to bias in public demand. Based on previous findings, it was hypothesized that stigma might come into play in affecting the general public's attitudes on resource allocation prevention, public education, research, and civil protection of infected people. Using a population-based, randomized household telephone survey, the present study aimed to assess and compare public attitudes towards these three types of infectious diseases, identifying the attributional sources of stigma, and exploring the relationships between stigma and public attitudes towards government policies.

Methods

A telephone survey was conducted between September and October, 2004, to assess public stigma towards SARS, HIV/AIDS, and TB among Hong Kong residents. Telephone numbers were drawn randomly from a pool of seed numbers based on the most updated Residential Telephone Directories, which contained almost all residential telephone numbers in Hong Kong. To capture unlisted numbers, the last two digits of the number selected were deleted and replaced by two random numbers generated by computer. If the household could not be reached, two more follow-up calls were made at different hours. The interviews were conducted between 6 and 10 pm on weekdays and 2 to 9 pm on Saturdays to avoid under-sampling of students and employed individuals. One eligible household member aged 18–65 whose birthday was the closest to the interview date was invited for interview in each residential unit. The selected participant was

interviewed regarding one of the three disease conditions based on random assignment and the interview was conducted in Cantonese, the native language spoken in Hong Kong. A total of 3011 participants took part in the interview, of which 1007, 1001, and 1003 participants were asked over views towards HIV/AIDS, SARS, and TB, respectively. The response rate, defined as number of complete interviews divided by total number of households contacted with an eligible person, was 45.5%, 47.3%, and 50% for HIV/AIDS, SARS, and TB, respectively. The demographic characteristics of the sampled participants are shown in Table 1. Forty-eight percent of the participants were male and 52% of the participants were female. Over half (54.2%) had a high school education. The majority (62.9%) of the participants were married or cohabiting. No significant difference was found among the three groups of participants (see Table 1).

Measures

Stigma towards the disease: A uniform 14-item scale was developed to measure the level of stigma towards a disease among the general public. The measure was developed by the first author and was based on ideas generated from focus groups and existing measures of psychiatric stigma (Link, Yang, Phelan, & Collins, 2004). The scale was designed to be applicable across all three disease conditions and to be unidimensional. Affective (five items), behavioral (six items), and cognitive (three items) aspects of stigma were examined in a 6-point Likert scale, with a higher score indicating a higher level of stigma towards the disease. Sample items include "HIV/AIDS/SARS/TB patients are revolting" (affective), "I will try my best to keep a distance from HIV/AIDS/SARS/TB patients" (behavioral), "HIV/AIDS/SARS/TB patients are a burden to the society" (cognitive). The reliability of the scale was satisfactory (Cronbach's alpha = .85 for HIV/AIDS, .81 for SARS, and .83 for TB). Given that the scale was unidimensional, the three indicators for public stigma were created based on the mean of the items representing each aspect of stigma.

Attribution of the disease: Participants were asked about their disease attribution with one item that directly measured each of the three aspects: *controllability* ("HIV/AIDS/SARS/TB patients have the ability to control their infection of the

Table 1
Demographic characteristics of the sample

Variables	HIV/AIDS ($N = 1007$)	SARS ($N = 1001$)	TB ($N = 1003$)	Total ($N = 3011$)	Difference between groups
Gender					$\chi^2 = .19$, ns
Male	481 (47.8%)	487 (48.7%)	480 (47.9%)	1448 (48.1%)	
Female	526 (52.2%)	514 (51.3%)	523 (52.1%)	1563 (51.9%)	
Age					$\chi^2 = 2.4$, ns
18–29	242 (24%)	226 (22.6%)	240 (23.9%)	708 (23.5%)	
30–49	519 (51.5%)	549 (54.8%)	525 (52.3%)	1593 (52.9%)	
50–65	246 (24.4%)	226 (22.6%)	238 (23.7%)	710 (23.6%)	
Education					$\chi^2 = 3.0$, ns
Less than primary	106 (10.5%)	113 (11.3%)	117 (11.7%)	336 (11.2%)	
Secondary	558 (55.5%)	536 (53.7%)	535 (53.5%)	1629 (54.2%)	
Tertiary/University	322 (32%)	336 (33.6%)	327 (32.6%)	985 (32.7%)	
Graduate School/higher	20 (2%)	14 (1.4%)	21 (2.1%)	55 (1.8%)	
Total Household Income					$\chi^2 = 6.6$, ns
Below $15,000	345 (38.3%)	338 (37.1%)	370 (40.1%)	1053 (38.5%)	
$15,001–$30,000	300 (33.3%)	309 (34.0%)	280 (30.4%)	889 (32.5%)	
$30,001–$45,000	128 (14.2%)	128 (14.1%)	116 (12.6%)	372 (13.6%)	
$45,001/above	128 (14.2%)	135 (14.8%)	156 (16.9%)	419 (15.3%)	
Marital status					$\chi^2 = 5.3$, ns
Single	329 (32.7%)	356 (35.6%)	375 (37.4%)	1060 (35.2%)	
Married or cohabiting	657 (65.5%)	624 (62.5%)	605 (60.6%)	1886 (62.9%)	
Separated/divorced/widowed	17 (1.7%)	18 (1.8%)	19 (1.9%)	54 (1.8%)	

disease''), *responsibility* (''HIV/AIDS/SARS/TB patients are responsible for their own infection''), and *blame* (''It is the HIV/AIDS/SARS/TB patients' own fault that they have the disease''). Each item was treated as the manifest variable in the model for each of the attribution constructs. Participants were asked whether they agreed to the above items on a 6-point Likert scale, with higher scores indicated greater internal controllability, personal responsibility to the disease, and more blame directed to the infected individuals.

Knowledge about the disease: Three condition-specific scales were developed to measure participants' knowledge about the three diseases. The items were developed based on the most common misconceptions about the respective diseases and on information provided by health authorities in Hong Kong and the United States (Center for Disease Control and Prevention, 2004; Hong Kong Health Department, 2004). They generally fell into the categories of transmission mode, symptoms, and treatment options. Participants were asked to indicate ''yes'', ''no'', or ''don't know'' for the items, with higher proportion of correct responses indicating better knowledge about the disease. Sample items on transmission mode included ''HIV/AIDS can be transmitted through the sharing of a toilet seat'', ''SARS can be transmitted through human sewage'', and ''TB can be transmitted through patients' clothing and blankets''. Proportion of correct responses was used in the analyses.

Public attitudes towards government policies: Four items were developed to examine participants' view regarding *prevention* (''The government should allocate more resources to the prevention of HIV/AIDS/SARS/TB''), *public education* (''The government should increase funding for public education in the prevention of HIV/AIDS/SARS/TB''), *research of the disease* (''Even if it means a tax raise, the government should devote more funding to HIV/AIDS/SARS/TB research''), and *anti-discrimination of the afflicted* (''Our society needs legislation to protect individuals with HIV/AIDS/SARS/TB against discrimination''). The items were measured in a 6-point Likert scale, with higher scores indicating more favorable views towards government policy.

Analytic strategies

Relationships between public stigma, the three attribution variables, and knowledge were first examined using Pearson correlations. To compare the level of public stigma and attributions towards HIV/AIDS, SARS, and TB, one-way analyses of variance (ANOVAs) were performed among the three groups.

To test the attribution model across AIDS/HIV, SARS, and TB, following the recommendations of Anderson and Gerbing (1988) and Kline (1998), confirmatory factor analysis (CFA) was first conducted on each infectious disease to evaluate the validity of the model, in which the latent factors were allowed to intercorrelate freely (Byrne, 1994). Then, multi-sample structural equation modeling (SEM) was conducted to test the proposed structural model relating controllability, responsibility, and blame to stigma. Three steps were followed in multi-sample analysis. First, all parameters were freely estimated across three samples in the baseline model (Model 1). Next, the factor loadings of stigma were constrained to be equal across samples in the model of factor invariance (Model 2). Third, the path coefficients between constructs were constrained to be equal across samples in the equal factor correlation model (Model 3). Both CFA and SEM were performed using EQS for Windows Version 6.1 (Bentler, 2003), which uses the maximum likelihood method to examine the overall fit of the models to the correspondent observed variance/covariance matrices.

Model fit was evaluated in several ways. First, χ^2 test was employed to evaluate the fit. Kline (1998) and Carmines and McIver (1981) have proposed χ^2/df values less than 3 as a criterion for a good fit. However, as χ^2 statistics are sample size dependent (Marsh, Balla, & McDonald, 1998), the large sample size in this study might have led to the failure of $p > .05$ with respect to different models. Therefore, the goodness-of-fit indices, specifically, the Comparative Fit Index (CFI) and the Root Mean Square Approximation Error (RMSEA), were also assessed. CFI ranges between 0 and 1, with values greater than .90 indicating good fit (Byrne, 1994). RMSEA is a measure of the discrepancy between the model and the data per degree of freedom. RMSEA values less than .05 indicate close fit (Browne & Cudeck, 1993).

Finally, to examine the effect of stigma on government policies, three multivariate analyses of variance (MANOVA), one for each disease condition, were conducted, with participants who scored higher than 75th percentile on public stigma being classified as high stigmatizing group and those who scored lower than 25th percentile on stigma being

classified as low stigmatizing group. Participants' views towards prevention, public education, research, and anti-discrimination of the disease were entered as dependent variables in the analyses.

Results

Descriptive statistics on stigma, attributions, and knowledge

The means and standard deviations of public stigma and attributions towards HIV/AIDS, SARS, and TB are shown in Table 2. The mean score of public stigma was the highest towards HIV/AIDS, followed by that of TB and SARS. More than one-third (36.8%) of the participants endorsed stigmatizing perceptions (stigma score >3) towards HIV/AIDS patients in the study, which was significantly greater than those towards SARS (3.7%) and TB (4.9%), $p<.001$. Knowledge about HIV/AIDS, SARS, and TB was comparable, with participants scoring an average of 79%, 74%, and 71% of the condition-specific items correct, respectively. A consistent pattern was found in disease attributions. Participants assigned greater controllability, responsibility, and blame to individuals with HIV/AIDS, followed by those with TB and the least to those with SARS, $ps<.001$. Significant correlations between attributions and public stigma were found in ascending magnitude ($r=.26$ for controllability, $r=.38$ for responsibility, and $r=.48$ for blame, $ps<.001$). On the other hand, disease knowledge and public stigma were not significantly related ($r=.03$, ns).

Attribution model of public stigma

CFA was used to evaluate the validity of the measurement model prior to testing the structural model. The results demonstrated an excellent fit of the model across AIDS ($\chi^2(6)=4.78$; CFI = 1.00; RMSEA = .00), TB ($\chi^2(6)=2.03$; CFI = 1.00; RMSEA = .00), and SARS ($\chi^2(6)=10.69$; CFI = 1.00; RMSEA = .03). All factor loadings were significant at the $p<.05$ level.

Based on findings from the multi-sample SEM (Model 1), the attribution model showed satisfactory fit across three disease conditions (CFI = .92, RMSEA = .04). This indicated that the attributional pathway from controllability to responsibility, from responsibility to blame, which led to public stigma, was supported across HIV/AIDS, SARS, and TB. Moving beyond configural invariance, the factor loadings of stigma were constrained across conditions to test for factor invariance (Model 2). The model showed satisfactory fit. The fit between Models 1 and 2 was not statistically different, $\Delta\chi^2(4)=3.03$, ns, indicating that across three conditions, factor invariance for public stigma was demonstrated. After demonstrating configural and factor invariance across diseases, to determine whether the contribution of each attribution constructs was equivalent across diseases, a series of models were tested with different combinations of paths constrained (Model 3.1–3.5). Table 3 showed a summary of the fit indices for each of the model tested.

Upon comparison among the path-constrained models, Model 3.4, with paths coefficients from Controllability to Responsibility and from Blame to Public Stigma constrained across HIV/AIDS, SARS, and TB, accounted for the best fit in explaining the attributional processes of public stigma and thus was chosen. The path from responsibility to blame was freely estimated in each group because constraining it resulted in a significant change in model fit, $\Delta\chi^2(6)=25.48$, $p<.01$ between Model 3.5 and Model 3.4. The path from responsibility to blame was strongest in HIV/AIDS,

Table 2
Mean (SD) public stigma and attributions across three diseases

Variables	HIV/AIDS ($N=1007$) M (SD)	SARS ($N=1001$) M (SD)	TB ($N=1003$) M (SD)	Group effects
Public stigma	2.84 (0.82)	1.73 (0.66)	1.94 (0.65)	$F(2, 3008)=685.91$***
Attribution of the diseases				
Controllability	3.58 (1.40)	2.61 (1.54)	2.88 (1.49)	$F(2, 3007)=254.52$***
Responsibility	3.80 (1.26)	2.42 (1.40)	2.99 (1.38)	$F(2, 3003)=265.72$***
Blame	3.11 (1.13)	1.74 (1.03)	2.08 (1.10)	$F(2, 2999)=430.64$***

***$p<.001$.

followed by TB and SARS. The contribution from controllability to responsibility and from blame to stigma was statistically equal across three diseases. The unstandardized coefficients of the paths are shown in Fig. 1.

Stigma on policy attitudes

Results from the MANOVAs found that the high- and low-stigma groups showed significant differences in policy attitudes across three diseases, $F(4, 541) = 15.90$, $p < .001$, Wilks' $\lambda = .90$ for HIV/AIDS; $F(4, 497) = 13.53$, $p < .001$, Wilks' $\lambda = .90$ for SARS; $F(4, 534) = 11.31$, $p < .001$, Wilks' $\lambda = .92$ for TB. Follow-up univariate analyses showed that the low-SARS stigma group expressed more favorable attitudes towards government policies on prevention, public education, research, and anti-discrimination than their high-SARS stigma counterparts. For HIV/AIDS, significant differences in attitudes were only found in prevention, public education, and anti-discrimination. Finally, differences in attitudes between TB stigma groups were only found in prevention, public education, and research (see Table 4).

Table 3
Summary statistics for tested models

Model	χ^2	*df*	*p*	CFI	RMSEA	$\Delta\chi^2$	Δdf	*p*
1.0	163.03	27	<.001	.92	.04			
2.0	166.06	31	<.001	.92	.04	3.03	4	>.50
3.1	168.88	33	<.01	.92	.04	2.88	2	>.10
3.2	186.59	33	<.01	.91	.04	20.58	2	<.01
3.3	168.18	33	<.01	.92	.04	2.17	2	>.10
3.4	171.00	35	<.01	.92	.04	4.95	4	>.10
3.5	191.54	37	<.001	.91	.04	25.48	6	<.01

1.0 Baseline model (Configural invariance).
2.0 Factor loadings being constrained (Factor invariance).
3 Path coefficients being constrained (Path equivalence).
3.1 Path coefficients from Controllability to Responsibility being constrained.
3.2 Path coefficients from Responsibility to Blame being constrained.
3.3 Path coefficients from Blame to Public Stigma being constrained.
3.4 Paths coefficients from Controllability to Responsibility and Blame to Public Stigma being constrained.
3.5 All path coefficients being constrained.

Discussion

This study aimed at comparing the magnitude of public stigma and elucidating the psychosocial processes underlying stigma among three types of infectious diseases in Hong Kong, namely, HIV/AIDS, SARS, and TB. Before the findings are discussed in further detail, some limitations of the present study are noted. First, to reduce the time of administration over the telephone and enhance the response rate, participants in the study were only randomly assigned to one disease condition instead of responding to all three conditions. Although this manipulation precluded concurrent examination of stigma and its psychosocial associates within the participant, given the sample across three disease conditions were similar and representative of the general population, merging the samples for aggregate analysis was deemed to be appropriate. Second, the stigma claimed by participants was relatively small, and it might suggest that their responses towards stigmatization and policy attitudes might be affected by social desirability. Although telephone survey is considered to be effective in ensuring anonymity thus maximizing honest responses from participants, we could not preclude the possibility that the participants may respond positively towards the three diseases. Thus, our findings might have underestimated the extent of stigmatization of the diseases.

Despite these limitations, the present study serves as a promising step in examining public stigma and

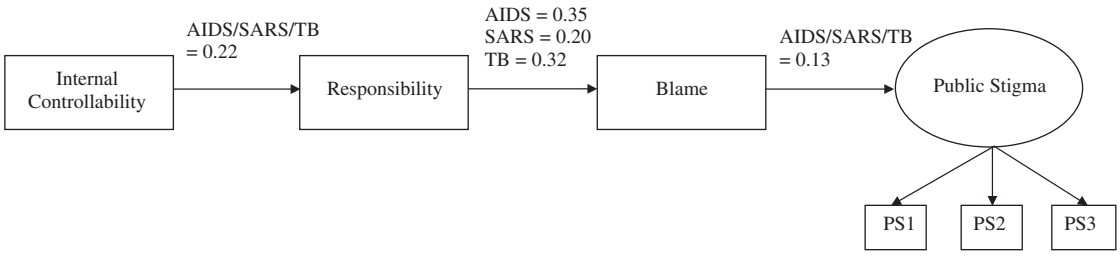

Fig. 1. Hypothesized structural model relating attribution constructs to public stigma across three disease conditions. Unstandardized path coefficients are shown. All coefficients were significant at the $p < .05$ level.

Table 4
Mean differences on government policies among low- and high-stigmatizing groups across three diseases

HIV/AIDS			
Government Policies	Low-stigmatizing group ($n = 273$)	High-stigmatizing group ($n = 273$)	Group effects
	M (SD)	M (SD)	F (1, 544)
Prevention	4.97 (1.26)	4.61 (1.15)	$F = 12.51$***
Public education	5.29 (1.03)	4.88 (1.00)	$F = 22.21$***
Research	4.33 (1.35)	4.12 (1.26)	$F = 3.49$
Anti-discrimination	4.61 (1.32)	3.78 (1.37)	$F = 52.00$***
SARS			
Government Policies	Low-stigmatizing group ($n = 242$)	High-stigmatizing group ($n = 260$)	Group effects
	M (SD)	M (SD)	F (1, 500)
Prevention	5.61 (0.91)	5.01 (1.21)	$F = 39.29$***
Public education	5.47 (1.00)	4.83 (1.19)	$F = 41.62$***
Research	5.17 (1.22)	4.52 (1.21)	$F = 36.05$***
Anti-discrimination	4.53 (1.65)	4.04 (1.48)	$F = 12.39$***
TB			
Government Policies	Low-stigmatizing group ($n = 258$)	High-stigmatizing group ($n = 281$)	Group effects
	M (SD)	M (SD)	F (1, 537)
Prevention	5.01 (1.28)	4.62 (1.09)	$F = 14.20$***
Public education	5.20 (1.11)	4.56 (1.14)	$F = 43.90$***
Research	4.55 (1.47)	4.22 (1.18)	$F = 8.67$**
Anti-discrimination	4.16 (1.90)	4.04 (1.32)	$F = 0.78$

**p.01, ***p<.001.

its policy implications based on the attribution model. Extending from previous studies that focused on describing public perceptions towards the diseases (Jaramillo, 1999; Lau et al., 2005; Malcolm et al., 1998), the present study focused on the explanatory factors of stigma and the resultant effects on policy attitudes. Results suggested that individuals with HIV/AIDS, TB, or those who were previously infected with SARS were stigmatized by the general public in a varying extent, with individuals diagnosed with HIV/AIDS being the most harshly and blatantly stigmatized, followed by those with TB and those who recovered from SARS. The public also perceived the infection of HIV/AIDS to be more internally controlled by the individuals and regarded individuals having HIV/AIDS as more responsible and blameworthy of their disease than their SARS and TB counterparts.

Differences in disease attributions and stigma hinge on several features related to the diseases: (1) whether the disease creates physical limitations to the infected, (2) whether the disease poses serious consequences to others, and (3) whether the disease is associated with symbolic meaning or negative images (Goldin, 1994; Herek, 1999; Pryor, Reeder, & Landau, 1999;). Unlike TB and SARS, which are highly contagious but can be readily cured with antibiotic medications, HIV/AIDS has been widely perceived to be a fatal condition with little hope of recovery since its earliest days (Malcolm et al., 1998). Thus, in terms of physical limitations to the infected, the courses of TB and SARS are acute but time-limited, whereas that of HIV/AIDS is chronic. As for disease threat, although all three diseases are infectious, HIV/AIDS may be regarded as posing the greatest level of threat to the general public in terms of its lethality. Previous research on AIDS stigma has found the disease to be associated with perception of danger, fear of contagion, and overestimation of risks caused by casual contact (Herek & Capitanio, 1993; Herek, Capitanio, & Widaman, 2002). Compared with TB, which may be seen as relatively benign given its treatability, AIDS has been considered as incurable (Peters et al., 1994) As for SARS, no new cases have been reported since

2003, and recovered SARS patients are not regarded as a threat to the public.

In addition to the chronic impact that the disease has on the infected and the severe threat it poses towards the public, HIV/AIDS also carries many negative connotations. It is often being associated with intravenous drug use, sexual promiscuity, and homosexuality/bisexuality; behaviors that in themselves are considered to be deviant and are subject to disapproval by the society (Crandall, Glor, & Britt, 1997; Herek & Capitanio, 1999; Herek & Glunt, 1988). The general public may perceive those infected with HIV/AIDS to have contracted it through voluntary and immoral behaviors, leading to the assignment of controllability, responsibility, and blame, and greater level of stigmatization. In contrast, SARS and TB do not carry this moral package. Although SARS and TB are associated with physical suffering, they are considered to be caused mainly by external factors, such as bacterial infection and poor hygiene, which are not perceived as morally reprehensible (Kelly, 1999). Thus, stigmatization of SARS and TB may be driven mainly by the dread of the illness itself, which may be reduced with a decrease level of perceived threat (Lee et al., 2005; Person et al., 2004).

Although the participants of the present study generally have a reasonably accurate knowledge about the three diseases in general, it is important to point out that the association between knowledge and stigma is negligible. As indicated, attributions about controllability, responsibility, and blame can provide a consistent and robust framework in explaining public stigma across the three diseases, despite the diverse nature and course shown in the three diseases. Given that public stigma is driven by lay beliefs and emotional responses and lacks a knowledge base, education makes little difference to making the public more accepting of conditions that are aversive to their lay beliefs (Kaye, 1998). In other words, factual understanding of the disease plays only a small role in shaping stigmatizing attitudes towards infected individuals. The public's perceptions or beliefs about the disease played a much greater role in stigma formation.

The present model provided preliminary support to the sequential processing of attribution in the development of stigma across three types of infectious diseases. In the attribution process (Weiner, 1995), people first make attributions about the controllability of the individual's illness, whether the individual can control disease contraction by him/herself. Their control attribution then leads to inferences about the responsibility of the infected, whether the individual is held personally responsible for the disease or is deemed helpless in the circumstances. Such inferences lead to emotional reactions as to whether the individual should be blamed, and to what extent the individual should be stigmatized. In the present study, the effects of controllability and blame were found to be equivalent across diseases, whereas the effect of responsibility varied. In other words, while the influence of controllability and blame was equal across diseases in the attribution process, responsibility has greater weight in the determination of blame towards TB and HIV/AIDS than towards SARS. Given that SARS is an acute and nascent disease with its nature still uncertain, the public may be less likely to blame people for their infection when much is unknown about the disease. On the other hand, given that TB and HIV/AIDS have been around for some time, the public is more likely to blame the people who are deemed to be responsible for contracting the disease. In future studies, researchers should account for risk perceptions and other illness perceptions, such as dread and familiarity, to further analyze the sources of stigma. Moreover, longitudinal design should be used to establish causation and to trace the stigma trajectory as the disease progresses over time (Alonzo & Reynolds, 1995).

The present study has identified constructs in the attribution process that can be targeted in stigma reduction programs. It also showed stigma to be related to public attitudes towards government policies. Whereas SARS stigma was found to affect public's views towards prevention, public education, research, and protection of the infected, stigma did not seem to affect public attitudes towards AIDS research and legal protection of individuals with TB. Given that AIDS is widely publicized in the media and much medical attention has been paid in the treatment of HIV/AIDS across the globe, the public may regard the support for AIDS research as already sufficient, or not necessary in Hong Kong. As to the protection of individuals with TB, since TB is treatable, the public may regard the infected status to be temporary and thus does not warrant any special legislation to protect against discrimination. Future research should focus on identifying disease-specific factors that may better inform us about public attitudes towards government policies.

In public health campaigns, to reduce stigma towards infectious diseases, emphasis should go

beyond factual knowledge. More efforts should be placed in strategically changing the attributions made by the public towards infectious diseases. In so doing, the public would develop more acceptable attitudes towards the diseases and the affected individuals, which in turn are related to more favorable attitudes towards governmental support. All in all, stigma plays a significant role in the battle against infectious diseases. For preventive programs of infectious diseases to be effective, their associated stigma must be actively addressed.

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