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Associative stigma among mental health professionals: a cross-sectional study

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Title: Associative stigma among mental health professionals: a cross-sectional study

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ABSTRACT

Objectives: (i) Investigate and explore the extent of associative stigma using latent class analysis; (ii) Determine the socio-demographic correlates of associative stigma; and (iii) Examine the relationship between associative stigma and job satisfaction, among mental health professionals.

Design: Cross-sectional online survey

Participants: Doctors, nurses and allied health staff, working in Singapore

Methods: Staff (n=462) completed an online survey which comprised 11 associative stigma items and also captured socio-demographic and job satisfaction related information. Latent class analysis was used to classify associative stigma upon patterns of observed categorical variables. Multinomial logistic regression was used to examine associations between socio-demographic factors and the different classes, while multiple linear regression analyses was used to examine the relationship between associative stigma and job satisfaction.

Results: The latent class analysis revealed that items formed a 3-class model where the classes were classified as 'no/low associative stigma', 'moderate associative stigma' and 'high associative stigma'. 48.7%, 40.5% and 10.8% of the population comprised no/low, moderate and high associative stigma classes, respectively. Multinomial logistic regression showed that years of service and occupation were significantly associated with moderate associative stigma, while factors associated with high associative stigma were education, ethnicity and occupation. Multiple linear regression analyses revealed that high associative stigma was significantly associated with lower job satisfaction scores.

Conclusion: Associative stigma was not uncommon among mental health professionals and was associated with various socio-demographic factors and poorer job satisfaction. Associative stigma has received comparatively little attention from empirical researchers and continued efforts to address this under-studied yet important construct in conjunction with future efforts to dispel misconceptions related to mental illness are needed.

Key words: associative stigma, latent class analysis, mental health, doctors, nurses, allied health staff

ARTICLE SUMMARY

Strengths and limitations of the study

- This is the first study to explore associative stigma among mental health professionals in Asia.
- Latent class analysis was used to classify associative stigma upon patterns of observed categorical variables.
- Multinomial logistic regression and multiple linear regression analyses were used to examine associations between socio-demographic factors and associative stigma and the relationship between associative stigma and job satisfaction.
- The study has some limitations including the cross-sectional design, it may be subjected to social desirability bias and it lacks generalisability due to inclusion criteria.

INTRODUCTION

Stigma relating to mental illness is a global issue and often results from misunderstandings, negative stereotypes and perceptions society has about people with mental illness. These people are frequently viewed or labeled as incompetent, irresponsible, unpredictable, and dangerous **[1]**. The consequences of stigma and discrimination result in people with mental illness avoiding care and treatment, preferring denial or choosing not to disclose their condition **[2]**. Furthermore this prejudice and discrimination has damaging effects to other aspects of their lives including employment and job opportunities, relationships, housing opportunities, life satisfaction as well as self-esteem and self-efficacy **[3-6]**. Stigma is multi-faceted and complex and impacts people with a mental illness, their families, caregivers, and even health professionals working in mental health care.

To date there has been extensive literature surrounding stigma towards those with a mental illness however stigma does not only affect those who are being stigmatized but can also emanate from close association to these people. Associative stigma otherwise referred to as affiliate stigma, courtesy stigma or secondary stigma describes the process by which a person experiences stigmatization as a result of an association with another stigmatized person **[2,7]**. This stigma by association may be experienced by parents, spouses, siblings, children, friends, caregivers or co-workers of the stigmatized. More recently, there has been a growing interest in associative stigma experienced by mental health professionals, whereby they or the psychiatric discipline is judged along the same stigmatizing stereotypes as their patients **[8]**. Negative and stigmatizing beliefs relating to mental health professionals not only discredit the valuable contributions these individuals make, but more importantly, these beliefs discredit the needs of

people who access mental healthcare. Furthermore, negative perceptions of mental health professionals may in fact further exacerbate the stigma of mental illness **[7]**.

There is a dearth of literature concerning associative stigma experienced by mental health care professionals. **Verhaeghe and Bracke [9]** investigated the link between associative stigma and burnout and job satisfaction among mental health professionals in Belgium, and found that associative stigma was related to more depersonalization, more emotional exhaustion, and less job satisfaction. In a second study, **Ben Natan et al., [10]** compared attitudes and stigma among psychiatric and non-psychiatric nurses in Israel and found that non-psychiatric nurses held more stigmatizing views towards mental illness, individuals with mental illness and the role of psychiatric nursing, although associative stigma did not differ between the two groups. A recent qualitative study among mental health clinicians from varying professional backgrounds including allied health staff, psychiatrists and law enforcement, found that these professionals commonly endorsed experiences of associative stigma from community members **[11]**. There have also been a few earlier studies which have explored associative stigma among nurses **[7,12, 13]**, whilst to our knowledge, in addition to the qualitative study described above, there has only been one other study that included allied health staff working in mental health care **[9]**, and none of which have been undertaken in Asian settings. Less is therefore known about the extent of associative stigma amongst health professionals working in Asia and how this may compare to Western cultures.

In order to bridge this gap and address this need, we have investigated associative stigma experienced by staff working at the Institute of Mental Health (IMH). IMH is the only tertiary psychiatric hospital in Singapore and encompasses a 2000 bed in-patient facility as well as specialist outpatient clinics and employs over 1500 doctors, nurses and allied health staff including psychologists, pharmacists, occupational therapists, physiotherapists, case managers and medical social workers. The aims of this study were to: (i) investigate and explore the extent of associative stigma; (ii) determine the socio-demographic correlates of associative stigma; and (iii) examine the relationship between associative stigma and job satisfaction, among mental health professionals (doctors, nurses, psychologists, pharmacists, occupational therapists, physiotherapists, case managers, counselors and medical social workers) working at IMH.

At the time this study was conducted, there was no developed or validated tool to measure associative stigma and accordingly comparisons across studies are difficult. In order to explore

associative stigma in the current study, latent class analysis was used. Previous research has mainly been conducted to develop and validate stigma scales that measure stigma towards those with a mental illness. However, much of this research has validated these scales using a variable-centered approach, such as exploratory and confirmatory factor analysis. Such methods measure stigma as a total community or population score and this mean score may not give the full picture of the complex phenomena of stigma, which is often multi-faceted within individuals and populations **[14]**.

An alternative approach that can enhance understanding of the varying characteristics and levels of stigma within a population is latent class analysis. Latent class analysis is a respondent-centered approach that aims to group individuals into class groups based on their responses to a set of observed variables. It has been widely used in behavioural and social science research to uncover unobserved heterogeneity in a population and to find substantively meaningful groups of people that are similar in their responses to measured variables or growth trajectories **[15]**. Once individuals are assigned to their most likely class, based on their responses to observed variables, it is then possible to examine other features such as socio-demographic correlates of each class, to determine predictors of these classes **[16]**.

METHODS

Participants and procedure

Doctors, nurses and allied health staff (psychologists, pharmacists, occupational therapists, physiotherapists, case managers and medical social workers) working at IMH were invited to participate in the survey, which was administered via Questionpro, an online survey application. Staff were informed of the study and the inclusion criteria via email and were sent a link to the online survey. Inclusion criteria required respondents to be: (i) Singapore citizens, permanent residents or foreigners with an employment or work permit; (ii) doctors, nurses, or allied health staff currently working at IMH and; (iii) aged 21 years and above. Staff who were willing to participate in the survey were required to read and accept an online consent form thus indicating their willingness and consent to participate in the study.

It was estimated that a sample size of approximately 200 nurses and 200 allied health staff would be needed to explore differences in associative stigma amongst the two groups, where sample size calculations were performed using PS (power and sample size calculation) software for comparing means. Accordingly, once this limit was reached, subsequent staff who wished to

participate in the survey were sent a message informing them recruitment had ceased. Data were collected between February and April 2016, with a total of 470 participants completing the study; eight cases were removed due to unreliable data or staff not meeting the inclusion criteria. Ethical approval was obtained from the Domain Specific Review Board of the National Healthcare Group, Singapore.

Measures

At the time this study was conducted, there was no developed and validated instrument which measured associative stigma. Two recent studies **[9,10]** derived items to measure associative stigma, based on their own literature reviews. Modified versions of some of these items were used and additional items were also added based on our own literature review. Five items were answered using a 5-point scale from never (1) to all the time (5) **[9]**:

1. People react negatively when they know I work in a mental health care setting[1]
2. People make jokes about me for working in a mental health care setting[1]
3. I feel ashamed to be working in a mental health care setting[1]
4. I am reluctant to tell people I work in a mental health care setting[1]
5. I have been treated unfairly by others when they learn I work in a mental health care setting.

An additional six items were answered using the following response categories and similar to those used by Ben Natan et al., **[10]**: Strongly agree; Slightly agree; Neither agree nor disagree; Slightly disagree; Strongly disagree. Items included:

1. Most people think less of a person who works in that works a mental health care setting
2. Once they know a person works in a mental health care setting, most people will take their opinions less seriously
3. Mental health care contributes to the health of people, families, communities and society in unique and meaningful ways[2]
4. The mental health profession lacks a scientific basis[2]
5. Working in a mental health care setting does not require special skills[2]
6. Mental health work is dangerous[2].

[1] Items were based on Verhaeghe et al., 2012

[2] Items were based on Ben Natan et al., 2015

Socio-demographic information was captured including age, gender, ethnicity, marital and residency status and education. In addition, staff were asked to indicate how long they had worked at IMH, their occupation, and to rate their job satisfaction on a scale from 1-10, where 1 indicated they were very dissatisfied and 10 indicated very satisfied.

Statistical analysis

All statistical analyses were done using SAS 9.2 (SAS Institute, Cary, North Carolina, USA). Mean and standard deviations were calculated for continuous variables, and frequencies and percentages for categorical variables.

Latent class analysis

Latent class analysis was used to classify associative stigma upon patterns of observed categorical variables. Latent class analysis is a "respondent-centered" approach that seeks to group individuals into "classes" based on their responses to a set of items **[16]**, and in this case, their responses to 11 associative stigma items. Latent class analysis is a mixture model that posits that there is an underlying unobserved categorical variable (i.e associative stigma) that divides a population into mutually exclusive and exhaustive latent classes. It is used to identify homogeneous subgroups, which share a common pattern of responses within a heterogeneous population. It relates a set of observed categorical variables to a set of latent variables. A latent class model with the optimal number of classes was determined using model fit statistics, including the likelihood ratio G^2, Akaike information criterion (AIC, smallest value preferred) and Bayesian information criterion (BIC, smallest value preferred), entropy (highest value preferred) values and interpretability of the derived classes **[17]**.

Multinomial logistic regression

Multinomial logistic regression was used to examine associations between socio-demographic factors including age, gender, ethnicity, marital and residency status, education, years of employment and occupation and the different classes. We also used multiple linear regression analyses to examine the relationship between associative stigma and job satisfaction with and without adjustment for socio-demographic correlates. Statistical significance were reported at $p < 0.05$.

RESULTS

The distribution of socio-demographic characteristics is presented in Table 1. The sample (n=462) comprised 58 doctors, 201 nurses and 203 allied health staff. The majority were female (63%), Chinese (60.2%) and had been working at IMH between one and five years (42.2%).

Eight unconditional models ranging from two to nine classes were compared to one another using fit statistics to determine the appropriate class structure (Table 2). The AIC value was lowest for the 4-class model (AIC=575.42) and the BIC value was lowest for the 3-class model (BIC=762.48). The BIC value typically is considered a better measure of model fit because it penalizes for model complexity more than the AIC **[17]**. A careful examination of both the 3 and 4-class model solutions led us to select the 3-class model because it was more easily identified, had greater parsimony, and its parameter estimates presented a solution with a more interpretable and distinct set of classes than the 4-class model (Figure 1).

The parameter estimates depicted in Figure 1 and Table 3 provide the necessary information for interpreting and labeling each class, with regards to item-response probability (IRP). IRP values range from 0 to 1, where numbers closer to 0 represent a low probability of endorsing a specific associative stigma item, whereas values closer to 1 represent a high probability of endorsing the item. Each class then consists of different probabilities of endorsement for each of the 11 associative stigma items. For example, the first latent class is characterized by a low IRP of endorsing the following items: “I feel ashamed to be working in a mental health care setting”(Item 3), “I am reluctant to tell people I work in a mental health care setting” (Item 4), “I have been treated unfairly by others when they learn I work in a mental health care setting” (Item 5), “Most people think less of a person who works in a mental health care setting” (Item 6), “Once they know a person works in a mental health care setting, most people will take their opinions less seriously” (Item 7), “Mental health care contributes to the health of people, families, communities and society in unique and meaningful ways” (Item 8), “The mental health profession lacks a scientific basis” (Item 9) and “Working in a mental health care setting does not require special skills” (Item 10). The IRP ranged from 0.001 to 0.16, thus we labeled this subgroup “no/low associative stigma”. Class 2 comprised staff who were more likely to report higher response probabilities for items 1 (“People react negatively when they know they work in a mental health care setting”), 2 (“People make jokes about me for working in a mental health care setting”), 7 and 11 (“Mental health work is dangerous”) than the “no/low stigma” and accordingly, we labeled this class as “moderate associative stigma”. Finally, the high probability of endorsing “sometimes”, “often” or “all the time” to items 1 and 2, and “strongly agree” or “slightly agree” to items 6, 7, 8, 9

and item 11 (IRP ranges from 0.66 to 0.91) were associated with class 3, which was labeled as “high associative stigma”. Within these three class groups, 48.7%, 40.5% and 10.8% of the population comprised no/low, moderate and high associative stigma classes, respectively.

The results of the multinomial logistic regression for the moderate and high associative stigma groups, with low stigma as the reference group are presented in Table 4. We found that staff working at IMH for less than one year (p=0.040), and between six and ten years (p=0.029) were less likely to have moderate associative stigma (versus staff working at IMH for more than 10 years). Occupation was also a significant predictor; doctors (p=0.007) and nurses (p=0.006) were significantly more likely to experience moderate associative stigma compared to allied health staff. Factors associated with high associative stigma were lower education (p=0.042), Indian ethnicity (p=0.043) and being a nurse (p=0.001).

Table 5 shows the results from multiple linear regression analyses. After adjusting for socio-demographic variables, high associative stigma remained significantly associated with lower job satisfaction scores (p<0.0001).

DISCUSSION

There is paucity in the current literature which investigates associative stigma experienced by mental health professionals. This is the first study to examine associative stigma among mental health professionals using latent class analysis and endeavors to expand and build our knowledge and understanding of the patterns of associative stigma amongst each of the classes. The findings reveal that three distinct classes exist; no/low, moderate and high associative stigma which were associated with unique socio-demographic correlates. Moderate associative stigma was significantly associated with years of service and occupation, while high associative stigma was associated with Indian ethnicity, lower education and occupation.

Findings revealed that 48.7%, 40.5% and 10.8% of staff working at a psychiatric hospital experienced no/low, moderate and high associative stigma, respectively. Whilst almost half of the staff experienced no or low associative stigma (48.7%), the remaining experienced moderate or high associative stigma, which is of concern. Moderate associative stigma comprised staff who were more likely to report higher response probabilities for the following items “People react negatively when they know they work in a mental health care setting”, “People make jokes about me for working in a mental health care setting”, “Once they know a person works in a mental

health care setting, most people will take their opinions less seriously" and "Mental health work is dangerous". These items relate largely to how other people perceive them and how they react towards them as a result of their profession and therefore efforts to better educate the general population as well as interventions targeting medical and nursing students are needed to dispel such misconceptions and stigma surrounding psychiatry and mental health care **[18]**. High associative stigma comprised staff that were also more likely to endorse items about other people's reactions however it also encompassed items about the mental health profession including "The mental health profession lacks a scientific basis" and "Working in a mental health care setting does not require special skills". Given the higher positive endorsement of the latter items, this indicates that even among mental health professionals, there is a level of stigma, uncertainty and even negative perceptions relating to mental health care and psychiatry and similar findings have also been previously reported **[8,10].** It is therefore possible that a consequence of experiencing ongoing associative stigma, results in these staff holding more discriminatory views, whereby they internalize this stigma or may have higher perceived stigma. Efforts within mental health care are needed to build self-esteem and self-confidence, whilst at the same time, taking the opportunity to highlight success stories in mental health to the public more frequently **[19]**.

Various socio-demographic differences were associated with moderate and high associative stigma. For example, Indians (compared to Chinese) were nearly three times more likely to experience high associative stigma. Whilst it is difficult to postulate why this may be, some possible explanations are provided. Firstly, high associative stigma was associated with higher probability of endorsing positive responses to items relating to (i) how staff perceive the mental health profession and (ii) how people react towards them. Regarding the latter, we do not know about the specific people stigmatizing these staff and therefore gaining a greater understanding of the types of people that judge and stigmatize mental health professionals would allow future anti-stigma efforts to be targeted towards these population sub-groups. For the former (how staff perceive the mental health profession), this relates to the individual's own personal views, whereby they perceive the discipline lacks a scientific basis, the profession doesn't require special skills or that mental health care doesn't contribute to the health of people, families and communities in a meaningful way. This could be an embedded cultural belief where in India psychiatry is still not considered an important medical specialty due to various societal apprehensions and ignorance **[20]**. Another possible explanation could be inferred from a recent population wide study in Singapore which found personal stigma towards people with mental

illness formed two distinct dimensions: 'weak-not-sick' and 'dangerous/unpredictable' **[21]**. Findings revealed that Indian ethnicity was significantly associated with higher scores on both factors, highlighting that Indians hold more stigmatizing attitudes and therefore it is possible that not only do they stigmatize more but hence perceive greater stigma. Mental illness stigma needs to be studied within its sociocultural context in order to understand its origins, meanings and consequences **[22]** and in doing so, this may provide great insight into the ethnic differences observed in relation to associative stigma.

Given the study sample comprised doctors, nurses and allied health professionals, the overwhelming majority were highly educated, with over 85% having a tertiary qualification or higher. Those with the least education, which still equates to approximately 10-11 years of education, were six times more likely to experience high associative stigma. Research locally and internationally has shown that those who are less educated tend to hold more stigmatizing views towards the mentally ill **[21,23,24].** Whilst these studies are related to stigma towards people with mental illness and not stigma by association, the two are inter-related and therefore could explain this finding. Another possible explanation could be that those working in mental healthcare are perceived to not 'require special skills' and therefore those with lower education are predominantly working in this profession. Alternatively, given that high associative stigma was related to a higher likelihood of positively endorsing items such as "The mental health profession lacks a scientific basis" and "Working in a mental health care setting does not require special skills" this may suggest that staff with less education perceive that being highly educated is not essential to this profession.

The number of years of service in a mental health hospital was associated with moderate associative stigma. Staff working at the psychiatric hospital for less than one year and those with 6-10 years of service, were less likely to experience moderate associative stigma, compared to those with over 10 years of service, whilst no significant differences were observed for those with 1-5 years of service. For newer staff (less than one year), their association via a professional capacity with people who have a mental illness would be minimal compared to those with over 10 years of experience. Therefore they would have only been exposed to possible associative stigma for this short period and hence less likely to experience any form of stigma, discrimination or prejudice. It is difficult however to postulate why staff with 6-10 years of service would experience less moderate associative stigma, versus those with over 10 years of service. **Halter [7]** in her study among nurses found that age was positively correlated with viewing psychiatric nurses as

skilled, logical, dynamic and or respected. The author speculated that years of experience increased the likelihood of contact with people with mental illness, thus mediating the influence of stigmatizing attitudes **[25]**. We predicted, that as a result of working in mental healthcare for an extended period, staff would no longer be confronted with associative stigma and people would be less likely to 'react negatively' or 'make jokes' about where they work, whilst at the same time they would be 'acclimatized' to working in this setting. It could also be a result of some form of 'stigma resistance', whereby these staff can resist or ignore the stigma associated with their profession, however this does not explain why staff with 6-10 years of service are less likely to experience associative stigma compared to those with over 10 years of service. Further research exploring the impact of the number of years or experience in mental health care and associative stigma are needed.

The strongest predictor of moderate and high associative stigma was occupation. Nurses were significantly more likely to experience both moderate and high associative stigma, while doctors were significantly more likely to experience moderate associative stigma, when compared to allied health staff. Numerous studies have recently investigated stigma towards mental health nursing **[12,26],** psychiatrists **[27,28]** and the discipline of psychiatry and mental health in general **[19,29]** which is often perpetuated by nurses, doctors, medical and nursing students and health professionals working in other sectors, as well as the general public **[25]**. Studies among medical students have shown that the overall status of psychiatry is low **[18]**, where perceived low prestige and low respect among other medical disciplines are among the main reasons for not choosing psychiatry **[30-34]**. Similarly, a recent study among nursing students in Singapore found that only 5.2% of students would 'definitely decide to do' psychiatric nursing **[35]**. A study among doctors which assessed reasons why they left the specialty they had initially chosen found that among psychiatrists, the most common reasons reported included the specialty's poor public image and the perceived lack of respect among other doctors **[36]**. It is therefore possible that for some doctors, psychiatry was not their first preference, whilst for others the sense of being 'looked down upon' by other health professionals resulted in increased associative stigma.

Several studies among nurses and nursing students have found that psychiatry is ranked as one of the least preferred, attractive and respected disciplines in nursing **[7,37]. Halter [7]** explored the characteristics attributed to nurses in multiple disciplines, where psychiatric nurses were often described as unskilled, illogical, idle and disrespected. Whilst it could not be concluded whether these attitudes and perceptions were a consequence of associative stigma, such perceptions

about nurses working at the only tertiary psychiatric hospital in Singapore could explain why nurses were significantly more likely to experience associative stigma. An alternative explanation could be related to how nurses are perceived. Previous research in Singapore has shown that the local population often possesses low perceptions of nurses **[38]**, which may further exacerbate the stigma they experience.

It is also possible that this stigma experienced by psychiatrists and nurses operates in two directions; the first being the stereotypic attitudes or perceptions projected out by them, whilst the second is the associated attributes projected on them, which they may internalize **[13]**. Irrespective of the type of stigma, it is important that mental health professionals are aware of this and how this may impact their role and work-related tasks. In order to address moderate and high associative stigma associated with nurses and psychiatrists, these mental health professionals need to explore and challenge such cases of stigma experienced by them. Associative stigma not only devalues the individual but also the profession as a whole and therefore mental health professionals play an important role in dispelling mental illness stigma **[13]**.

Associative stigma was found to be associated with job satisfaction. After adjusting for socio-demographic correlates, we found that high associative stigma was associated with poorer job satisfaction. **Verhaeghe and Bracke [9]** found associative stigma was associated with depersonalization and emotional exhaustion among mental health professionals in Belgium, with the latter leading to decreased job satisfaction. The consequences of stigma in relation to job satisfaction have been well documented. Similarly, associative stigma among mental health professionals, can contribute to job stress and poorer outcomes not only in terms of staff well-being but the quality of care provided to patients and therefore the implications can be detrimental to both staff and their patients. Due to the cross-sectional nature of this study, the relation between job satisfaction and associative stigma could be bi-directional and therefore exploring this association over time would be beneficial.

The findings of this study should be viewed in light of the following limitations. Firstly, at the time the study was conducted, there was no developed and validated associative stigma measure, and therefore items used to measure associative stigma were based on previous research. Whilst such items have previously been used to measure associative stigma among various health care professionals, the settings have varied and therefore a detailed pilot or expert review in the local setting, would have been beneficial. Furthermore, given research has consistently highlighted the

stigma associated with the mental healthcare profession, there is a need for a validated instrument which measures this important construct. This was a cross-sectional study among staff working at IMH and therefore these findings are not generalizable to all mental health professionals in Singapore, nor could causal relationships be established. However, given that this hospital is the primary provider of tertiary psychiatric care in Singapore, and all staff included in the study are involved with the care of patients with mental illness, it provides valuable insight into the stigma associated with the mental health profession. The study was limited to doctors, nurses and allied health staff and therefore associative stigma of other staff including health care attendants, patient services associates and administrative staff was not gathered and may differ. Data were not collected on response rates, but rather once the desired quota of nurses and allied health staff was reached (i.e 200 of each group) recruitment ceased, therefore it is difficult to ascertain the degree of selection bias. Finally, data collected were based on self-report and therefore respondents may have provided socially desirable responses or may not have felt comfortable disclosing possible stigma they may have experienced.

These limitations notwithstanding, this is one of just a few studies to explore associative stigma among mental health professionals, and to our knowledge the only study to explore this within an Asian setting, and has thus added to the existing sparse literature. Using latent class analysis, the current study has provided a greater understanding of the extent of associative stigma among psychiatrists, nurses and allied health staff working at a psychiatric hospital. A 3-class model of associative stigma was found to have the best fit, where classes were labeled as no/low, moderate and high associative stigma. Based on these classes, it would be beneficial to further explore this construct via longitudinal studies or repeatedly measuring associative stigma over time to compare outcomes across the different classes in order to determine effective interventions to reduce associative stigma among mental health professionals. At the same time, there is also a scarcity of literature relating to the development and evaluation of interventions to combat stigma experienced by health professionals **[18]**. Research has however shown that increment or improvement in knowledge as well as actual contact with people who have a mental illness can help to reduce stigma, whilst improving the image of psychiatry and psychiatrists **[19]**.

There is a need to further explore the outcomes of associative stigma, not just from the perspective of those experiencing this stigma (in this case mental health professionals) but the impact this stigma may have on their patients and potentially the wider community. Given that high associative stigma was associated with poorer job satisfaction, which has been shown to

have poorer outcomes for patients **[9]**, the implications of this finding are not only important to the well-being of staff but also patients. In order to address and reduce associative stigma among mental health professionals, we need to know more about those who are stigmatizing mental health professionals, so targeted interventions towards these people or population sub-groups can be implemented to help reduce associative stigma and stigma in general. As stigma towards people with mental illness, psychiatrists, and the mental health profession is highly interrelated, the ongoing process and difficult task of combating mental illness stigma continues. Associative stigma has received comparatively little attention from empirical researchers and continued efforts to address this under-studied yet important construct in conjunction with future efforts to dispel many of these misconceptions are needed.

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DECLARATIONS

Ethics approval: Ethical approval was obtained from the Domain Specific Review Board of the National Healthcare Group, Singapore prior to the launch of the survey.

Patient consent: Obtained

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Competing interest: The authors declare they have no competing interests

Author contributions: LP developed the study design, collected and verified the data and wrote the manuscript. SC assisted with the data collection and verification and provided intellectual inputs to the manuscript. EA and QY analyzed and interpreted the data and provided intellectual inputs to the manuscript. BYC assisted with the set-up and monitored the online survey and provided intellectual inputs to the manuscript. JAV provided intellectual inputs into the study design and interpretation of the findings. SO and KLY provided intellectual inputs into the study design and provided inputs to the manuscript. HCC provided clinical inputs into the findings and edited the manuscript. SAC and MS assisted in study design, interpreted the data, and provided intellectual inputs on the manuscript. All authors read and approved the final manuscript.

Availability of data and materials: Data is not available for online access, however readers who wish to gain access to the data can write to the senior author Dr Mythily Subramaniam at mythily@imh.com.sg with their requests. Access can be granted subject to the Institutional

Review Board (IRB) and the research collaborative agreement guidelines. This is a requirement mandated for this research study by our IRB and funders.

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Table 1: Characteristics of the study sample

Characteristics		n	%
Age (mean years, SD)		36.4	10.6
Gender	Female	291	63.0
	Male	171	37.0
Ethnicity	Chinese	278	60.2
	Malay	36	7.8
	Indian	64	13.8
	Filipino	59	12.8
	Myanmar	16	3.5
	Others	9	1.9
Marital status	Never married	205	44.4
	Ever married	257	55.6
Education level	Secondary/ ITE/'O' level	18	3.9
	'A' level/diploma	49	10.6
	Bachelor	241	52.2
	Master or above	154	33.3
Residential status	Singapore Citizen	320	69.2
	Permanent Resident	59	12.8
	Non Resident	83	18.0
Occupation	Doctor	58	12.6
	Nurse	201	43.5
	Allied Health	203	43.9
Years worked at Institute Of Mental Health	Less than 1 year	52	11.3
	1-5 years	195	42.2
	6-10 years	103	22.3
	More than 10 years	112	24.2

Table 2: Model comparisons and fit indices

Classes	AIC	BIC	CAIC	ABIC	Entropy
2	711.02	806.14	829.14	733.14	0.77
3	617.74	**762.48**	797.48	651.40	0.80
4	575.42	769.79	816.79	620.63	0.78
5	571.02	815.02	874.02	627.77	0.79
6	589.06	882.69	953.69	657.35	0.68
7	549.33	892.58	975.58	629.16	0.78
8	550.76	943.64	1038.64	642.13	0.80
9	567.26	1009.77	1116.77	670.18	0.80

Note: Akaike information criterion (AIC), Bayesian information criterion (BIC), consistent AIC (CAIC), adjusted BIC (ABIC) and enthropy all measure model fit. These model comparison measurements were used for choosing the optimal number of classes in latent class analysis, where the models with the smallest values indicate a better fit.

Table 3: Three latent class model of associative stigma prevalence and item-response probabilities

		Latent class		
		CLASS 1	CLASS 2	CLASS 3
		No/low	Moderate	High
		Prevalence		
		48.7%	40.5%	10.8%
Item	Statement	Item response probabilities*		
1	People react negatively when they know I work in a mental health care setting	0.46	0.70	0.91
2	People make jokes about me for working in a mental health care setting	0.56	0.65	0.91
3	I feel ashamed to be working in a mental health care setting	0.00	0.00	0.39
4	I am reluctant to tell people I work in a mental health care setting	0.10	0.09	0.49
5	I have been treated unfairly by others when they learn I work in a mental health care setting	0.04	0.13	0.50
6	Most people think less of a person who works in a mental health care setting	0.04	0.86	0.77
7	Once they know a person works in a mental health care setting, most people will take their opinions less seriously	0.00	0.65	0.81
8	Mental health care contributes to the health of people, families, communities and society in unique and meaningful ways	0.08	0.15	0.60
9	The mental health profession lacks a scientific basis	0.16	0.27	0.79
10	Working in a mental health care setting does not require special skills	0.02	0.02	0.36
11	Mental health work is dangerous	0.45	0.59	0.66

*Item response probability values range from 0 to 1, where numbers closer to 0 represent a low probability of endorsing a specific item, whereas values closer to 1 represent a high probability of endorsing the item.

Table 4: Socio-demographic correlates of associative stigma among mental health professionals

		Moderate Associative Stigma				High Associative Stigma			
		Odds Ratio	95% CI		p value	Odds Ratio	95% CI		p value
Age		0.98	0.95	1.00	0.092	0.98	0.94	1.02	0.345
Sex	Female	Ref							
	Male	1.23	0.78	1.94	0.369	1.18	0.57	2.43	0.655
Residency status	Singapore Citizen	Ref							
	Permanent Resident	1.34	0.64	2.82	0.443	0.72	0.21	2.48	0.607
	Non Resident	1.12	0.47	2.65	0.801	0.36	0.08	1.66	0.189
Ethnicity	Chinese	Ref							
	Malay	0.59	0.22	1.55	0.282	0.97	0.29	3.26	0.965
	Indian	1.61	0.80	3.27	0.186	**2.97**	**1.04**	**8.53**	**0.043**
	Filipino	0.88	0.31	2.45	0.802	3.00	0.63	14.38	0.170
	Myanmar	1.69	0.43	6.62	0.450	0.92	0.07	11.56	0.947
	Others	1.13	0.25	5.19	0.874	.	.	.	.
Marital status	Never married	Ref							
	Ever married	1.13	0.70	1.83	0.625	1.06	0.48	2.37	0.885
Education	Secondary/ 'O/N' level[a]	3.06	0.77	12.10	0.111	**6.18**	**1.07**	**35.89**	**0.042**
	'A' level[b] & diploma	1.61	0.62	4.21	0.333	2.50	0.61	10.28	0.203
	Bachelor	1.22	0.71	2.11	0.470	1.28	0.44	3.74	0.656
	Masters or above	Ref							
Occupation	Doctor	**2.74**	**1.31**	**5.71**	**0.007**	2.22	0.46	10.84	0.324
	Nurse	**2.44**	**1.29**	**4.64**	**0.006**	**6.62**	**2.23**	**19.63**	**0.001**
	Allied Health	Ref							
Years worked at IMH*	<1 year	**0.36**	**0.13**	**0.95**	**0.040**	0.23	0.03	1.71	0.151
	1-5 years	0.53	0.25	1.09	0.083	0.98	0.28	3.39	0.977
	6-10 years	**0.45**	**0.22**	**0.92**	**0.029**	0.79	0.24	2.55	0.689
	>10 years	Ref							

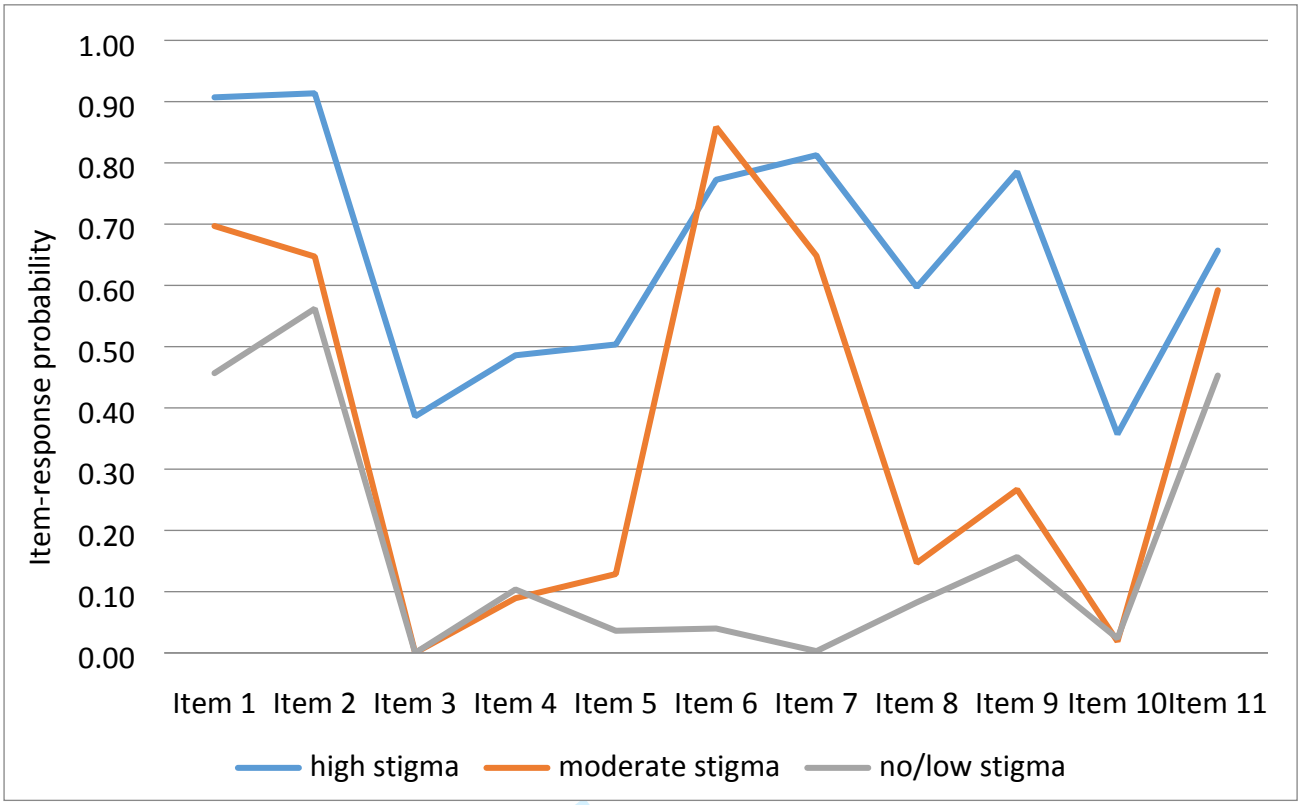
*Institute of Mental Health a= 'O' and 'N' levels indicate10 and 11 years of education, respectively. B= 'A' level indicates 12 years of education.

Table 5: Relationship between associative stigma and job satisfaction

	n	Mean	SD	Model 1				Model 2			
				Beta coeff.	95% CI		p value	Adjusted Beta coeff.	95% CI		p value
No/low associative stigma	225	7.24	1.52	Ref.				Ref.			
Moderate associative stigma	187	7.26	1.51	0.02	-0.28	0.32	0.9132	-0.18	-0.49	0.12	0.2337
High associative stigma	50	6.46	1.79	-0.78	-1.26	-0.30	**0.0013**	-1.08	-1.57	-0.59	**<.0001**

Ref= Reference group
Model 1 = Simple linear regression
Model 2 = Multiple linear regression after adjusting for socio-demographic correlates including age, gender, ethnicity, residency status, marital status, education, occupation and years worked at Institute of Mental Health

Figure 1: 3-class unconditional latent class analysis of associative stigma



STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3
Objectives	3	State specific objectives, including any prespecified hypotheses	4
Methods			
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	6
Bias	9	Describe any efforts to address potential sources of bias	
Study size	10	Explain how the study size was arrived at	5
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	7
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	7
		(*b*) Describe any methods used to examine subgroups and interactions	
		(*c*) Explain how missing data were addressed	
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	
		(*e*) Describe any sensitivity analyses	
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	7-8
		(b) Give reasons for non-participation at each stage	
		(c) Consider use of a flow diagram	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	7-8
		(b) Indicate number of participants with missing data for each variable of interest	
Outcome data	15*	Report numbers of outcome events or summary measures	
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	8-9
		(*b*) Report category boundaries when continuous variables were categorized	
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	8-9
Discussion			
Key results	18	Summarise key results with reference to study objectives	9-12
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	13-14
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	14-15
Generalisability	21	Discuss the generalisability (external validity) of the study results	14
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	15

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Associative stigma among mental health professionals in Singapore: a cross-sectional study

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ABSTRACT

Objectives: (i) Investigate and explore whether different classes of associative stigma (the process by which a person experiences stigmatization as a result of an association with another stigmatized person) could be identified using latent class analysis; (ii) Determine the socio-demographic and employment related correlates of associative stigma; and (iii) Examine the relationship between associative stigma and job satisfaction, among mental health professionals.

Design: Cross-sectional online survey

Participants: Doctors, nurses and allied health staff, working in Singapore

Methods: Staff (n=462) completed an online survey which comprised 11 associative stigma items and also captured socio-demographic and job satisfaction related information. Latent class analysis was used to classify associative stigma upon patterns of observed categorical variables. Multinomial logistic regression was used to examine associations between socio-demographic and employment related factors and the different classes, while multiple linear regression analyses was used to examine the relationship between associative stigma and job satisfaction.

Results: The latent class analysis revealed that items formed a 3-class model where the classes were classified as 'no/low associative stigma', 'moderate associative stigma' and 'high associative stigma'. 48.7%, 40.5% and 10.8% of the population comprised no/low, moderate and high associative stigma classes, respectively. Multinomial logistic regression showed that years of service and occupation were significantly associated with moderate associative stigma, while factors associated with high associative stigma were education, ethnicity and occupation. Multiple linear regression analyses revealed that high associative stigma was significantly associated with lower job satisfaction scores.

Conclusion: Associative stigma was not uncommon among mental health professionals and was associated with various socio-demographic factors and poorer job satisfaction. Associative stigma has received comparatively little attention from empirical researchers and continued efforts to address this under-studied yet important construct in conjunction with future efforts to dispel misconceptions related to mental illnesses are needed.

Key words: associative stigma, latent class analysis, mental health, doctors, nurses, allied health staff

ARTICLE SUMMARY

Strengths and limitations of the study

- This is the first study to explore associative stigma among mental health professionals in Asia.
- Latent class analysis was used to classify associative stigma upon patterns of observed categorical variables.
- Multinomial logistic regression and multiple linear regression analyses were used to examine associations between socio-demographic factors and associative stigma and the relationship between associative stigma and job satisfaction.
- The study has some limitations including the cross-sectional design, it may be subjected to social desirability bias and it lacks generalisability due to inclusion criteria.

INTRODUCTION

Stigma is a complex and multi-faceted construct and often results from misunderstandings and perceptions society has about people with mental illnesses. Link and Phelan describe stigma as an overarching construct that exists when five interrelated components occur: (1) labelling, (2) negative attributes, (3) separation (4) status loss and (5) discrimination **[1]**. People with mental illnesses are frequently viewed or labeled as incompetent, irresponsible, unpredictable, and dangerous **[2]**. The consequences of this prejudice and discrimination can result in people with mental illnesses avoiding care and treatment, preferring denial or choosing not to disclose their condition **[3]**. This can then have damaging effects to other aspects of their lives including employment and job opportunities, relationships, housing opportunities, life satisfaction as well as self-esteem and self-efficacy **[4-7]**. The impact of stigma is significant not only for people with mental illnesses, but also their families, caregivers, and even health professionals providing mental health care.

To date there has been extensive literature surrounding stigma towards those with a mental illness however stigma does not only affect those who are being stigmatized but can also emanate from close association to these people. Associative stigma otherwise referred to as affiliate stigma, courtesy stigma or secondary stigma describes the process by which a person experiences stigmatization as a result of an association with another stigmatized person **[3,8]**. This stigma by association may be experienced by parents, spouses, siblings, children, friends, caregivers or co-workers of the stigmatized. More recently, there has been a growing interest in associative stigma experienced by mental health professionals, whereby they or the psychiatric

discipline is judged along the same stigmatizing stereotypes as their patients **[9]**. Negative and stigmatizing beliefs relating to mental health professionals not only discredit the valuable contributions these individuals make, but more importantly, these beliefs discredit the needs of people who access mental healthcare. Furthermore, negative perceptions of mental health professionals may in fact further exacerbate the stigma of mental illnesses **[8]**.

There is a dearth of literature concerning associative stigma experienced by mental health care professionals. **Verhaeghe and Bracke [10]** investigated the link between associative stigma and burnout and job satisfaction among mental health professionals in Belgium, and found that associative stigma was related to more depersonalization, more emotional exhaustion, and less job satisfaction. In a second study, **Ben Natan et al., [11]** compared attitudes and stigma among psychiatric and non-psychiatric nurses in Israel and found that non-psychiatric nurses held more stigmatizing views towards mental illnesses, individuals with a mental illness and the role of psychiatric nursing, although associative stigma did not differ between the two groups. A recent qualitative study among mental health clinicians from varying professional backgrounds including allied health staff, psychiatrists and law enforcement, found that these professionals commonly endorsed experiences of associative stigma from community members **[12]**. There have also been a few earlier studies which have explored associative stigma among nurses **[8,13, 14]**, whilst to our knowledge, besides the qualitative study described above, there has only been one other study that included allied health staff working in mental health care **[10]**, and none of which have been undertaken in Asian settings. Less is therefore known about the extent of associative stigma amongst health professionals working in Asia and how this may compare to Western cultures.

At the time this study was conducted, there was no developed or validated tool to measure associative stigma and accordingly comparisons across studies are difficult. A recent study however has explored the validity and factor structure of associative stigma via the Clinician Associative Stigma Scale (CASS) [15]. Findings revealed that amongst a sample of clinicians in the US, the CASS displayed good internal consistency and evidence of convergent validity and is an effective tool for measuring associative stigma among mental health professionals who work with people with serious mental illness. A second study, has also validated this scale amongst a sample of clinicians in China, with results revealing how cultural differences can impact associative stigma [16].

The current study investigated associative stigma experienced by staff working at the Institute of

Mental Health (IMH). IMH is the only tertiary psychiatric hospital in Singapore and encompasses a 2000 bed in-patient facility as well as specialist outpatient clinics and employs over 1500 doctors, nurses and allied health staff including psychologists, pharmacists, occupational therapists, physiotherapists, case managers and medical social workers. The aims of this study were to: (i) investigate and explore whether different classes of associative stigma could be identified using latent class analysis; (ii) determine the socio-demographic and employment related correlates of associative stigma; and (iii) examine the relationship between associative stigma and job satisfaction, among mental health professionals (doctors, nurses, psychologists, pharmacists, occupational therapists, physiotherapists, case managers, counselors and medical social workers) working at IMH.

In order to explore associative stigma in the current study, latent class analysis was used. Previous research has mainly been conducted to develop and validate stigma scales that measure stigma towards those with a mental illness. However, much of this research has validated these scales using a variable-centered approach, such as exploratory and confirmatory factor analysis. Such methods measure stigma as a total community or population score and this mean score may not give the full picture of the complex phenomena of stigma, which is often multi-faceted within individuals and populations **[17]**.

An alternative approach that can enhance understanding of the varying characteristics and levels of stigma within a population is latent class analysis. Latent class analysis is a respondent-centered approach that aims to group individuals into class groups based on their responses to a set of observed variables. It has been widely used in behavioural and social science research to uncover unobserved heterogeneity in a population and to find substantively meaningful groups of people that are similar in their responses to measured variables or growth trajectories **[18]**. Once individuals are assigned to their most likely class, based on their responses to observed variables, it is then possible to examine other features such as socio-demographic correlates of each class, to determine predictors of these classes **[19]**.

METHODS

Participants and procedure

All doctors, nurses and allied health staff (psychologists, pharmacists, occupational therapists, physiotherapists, case managers and medical social workers) working at IMH were invited to participate in the survey, which was administered via Questionpro, an online survey application.

Staff were informed of the study and the inclusion criteria via email and were sent a link to the online survey. Inclusion criteria required respondents to be: (i) Singapore citizens, permanent residents or foreigners with an employment or work permit; (ii) doctors, nurses, or allied health staff currently working at IMH and; (iii) aged 21 years and above. Staff who were willing to participate in the survey were required to read and accept an online consent form thus indicating their willingness and consent to participate in the study.

In order to explore employment related correlates such as occupation, it was estimated that a sample size of approximately 200 nurses and 200 allied health staff would be needed to explore differences in associative stigma amongst the two groups, where sample size calculations were performed using PS (power and sample size calculation) software for comparing means. As reported in a previous study, Natan et al [11] found there to be significant mean difference in stigma scores between psychiatric and non psychiatric nurses, with psychiatric nurses having more positive attitudes towards mental illness (mean= 2.5; SD= 0.76 versus mean = 2.25; SD= 0.71), individuals with mental illness (mean= 3.33; SD= 0.6) versus mean= 3.57; SD=0.7) and the role of psychiatric nursing (mean=1.79; SD=0.6 versus mean=2.5; SD=0.5). Assuming a significance level at p value less than 0.05 and 80% power of the study, the minimum sample size required to replicate these analysis is 146 subjects per group (i.e., Group 1= nurses and Group 2= allied health (psychologists, pharmacists, occupational therapists, physiotherapists, case managers, counselors and medical social workers)). Taking into account a 40% rate of incomplete or partial completesa sample size of 200 per group (400 in total) was required. Accordingly, once this limit was reached, subsequent staff who wished to participate in the survey were sent a message informing them recruitment had ceased. Data were collected between February and April 2016, with a total of 470 participants completing the study; eight cases were removed due to unreliable data or staff not meeting the inclusion criteria. Ethical approval was obtained from the Domain Specific Review Board of the National Healthcare Group, Singapore.

Patient and public involvement

There was no patient or public involvement in the study design, however staff at IMH will be informed of the study findings.

Measures

At the time this study was conducted, there was no developed and validated instrument which measured associative stigma. Two recent studies **[10,11]** derived items to measure associative

stigma, based on their own literature reviews. Modified versions of some of these items were used and additional items were also added based on our own literature review. Five items were answered using a 5-point Likert scale (i.e Never, Rarely, Sometimes, Often, All the time) **[10]**:

1. People react negatively when they know I work in a mental health care setting[1]
2. People make jokes about me for working in a mental health care setting[1]
3. I feel ashamed to be working in a mental health care setting[1]
4. I am reluctant to tell people I work in a mental health care setting[1]
5. I have been treated unfairly by others when they learn I work in a mental health care setting.

An additional six items were answered using the following response categories and similar to those used by Ben Natan et al., **[11]**: Strongly agree (1); Slightly agree (2); Neither agree nor disagree (3); Slightly disagree (4); Strongly disagree (5). Items included:

1. Most people think less of a person who works in a mental health care setting
2. Once they know a person works in a mental health care setting, most people will take their opinions less seriously
3. Mental health care contributes to the health of people, families, communities and society in unique and meaningful ways[2]
4. The mental health profession lacks a scientific basis[2]
5. Working in a mental health care setting does not require special skills[2]
6. Mental health work is dangerous[2].

Socio-demographic information was captured including age, gender, ethnicity, marital and residency status and education. In addition, staff were asked to indicate how long they had worked at IMH, their occupation, and to rate their job satisfaction on a scale from 1-10, where 1 indicated they were very dissatisfied and 10 indicated very satisfied.

Statistical analysis

All statistical analyses were done using SAS 9.2 (SAS Institute, Cary, North Carolina, USA). Mean and standard deviations were calculated for continuous variables, and frequencies and percentages for categorical variables. Missing data were very low (0.2 to 0.6%) and only in relation to associative stigma items. Listwise deletion methods were applied for all analyses.

[1] Items were based on Verhaeghe et al., 2012

[2] Items were based on Ben Natan et al., 2015

Latent class analysis

Latent class analysis was used to classify associative stigma upon patterns of observed categorical variables. Latent class analysis is a "respondent-centered" approach that seeks to group individuals into "classes" based on their responses to a set of items **[19]**, and in this case, their responses to 11 associative stigma items. All items responses were dichotomized (strongly agree, slightly agree, often, sometimes or all the time were combined as one category while neither agree nor disagree, slightly disagree, strongly disagree, never or rarely were combined as one category). Latent class analysis is a mixture model that posits that there is an underlying unobserved categorical variable (i.e associative stigma) that divides a population into mutually exclusive and exhaustive latent classes. It is used to identify homogeneous subgroups, which share a common pattern of responses within a heterogeneous population. It relates a set of observed categorical variables to a set of latent variables. A latent class model with the optimal number of classes was determined using model fit statistics, including the likelihood ratio G^2, Akaike information criterion (AIC, smallest value preferred) and Bayesian information criterion (BIC, smallest value preferred), entropy (highest value preferred) values and interpretability of the derived classes **[20]**. All latent class analyses were conducted by PROC LCA in SAS 9.4 software.

Multinomial logistic regression

Multinomial logistic regression was used to examine associations between socio-demographic factors including age, gender, ethnicity, marital and residency status, education, years of employment and occupation and the different classes. Multinomial logistic regression analysis was chosen as it is an appropriate statistical test when analyzing outcome variables with more than 2 categories. We also used multiple linear regression analyses to examine the relationship between associative stigma and job satisfaction with and without adjustment for socio-demographic correlates. Statistical significance were reported at $p < 0.05$.

RESULTS

The distribution of socio-demographic characteristics is presented in Table 1. The sample (n=462) comprised 58 doctors, 201 nurses and 203 allied health staff. The majority were female (63%), Chinese (60.2%) and had been working at IMH between one and five years (42.2%).

Eight unconditional models ranging from two to nine classes were compared to one another using fit statistics to determine the appropriate class structure (Table 2). The AIC value was lowest for the 7-class model (AIC=549.33) and the BIC value was lowest for the 3-class model (BIC=762.48), followed by 4-class model (BIC=769.79). The BIC value typically is considered a better measure of model fit because it penalizes for model complexity more than the AIC **[20]**. A careful examination of both the 3 and 4-class model solutions led us to select the 3-class model because it was more easily identified, had greater parsimony, and its parameter estimates presented a solution with a more interpretable and distinct set of classes than the 3-class model (Figure 1).

The parameter estimates depicted in Figure 1 and Table 3 provide the 3-class model of associative stigma prevalence and item-response probability (IRP). IRP values range from 0 to 1, where numbers closer to 0 represent a low probability of endorsing a specific associative stigma item, whereas values closer to 1 represent a high probability of endorsing the item. Each class then consists of different probabilities of endorsement for each of the 11 associative stigma items. For example, the first latent class is characterized by a low IRP of endorsing the following items: "I feel ashamed to be working in a mental health care setting"(Item 3), "I am reluctant to tell people I work in a mental health care setting" (Item 4), "I have been treated unfairly by others when they learn I work in a mental health care setting" (Item 5), "Most people think less of a person who works in a mental health care setting" (Item 6), "Once they know a person works in a mental health care setting, most people will take their opinions less seriously" (Item 7), "Mental health care contributes to the health of people, families, communities and society in unique and meaningful ways" (Item 8), "The mental health profession lacks a scientific basis" (Item 9) and "Working in a mental health care setting does not require special skills" (Item 10). The IRP ranged from 0.001 to 0.16, thus we labeled this subgroup "no/low associative stigma". Class 2 comprised staff who were more likely to report higher response probabilities for items 1 ("People react negatively when they know they work in a mental health care setting"), 2 ("People make jokes about me for working in a mental health care setting"), 7 and 11 ("Mental health work is dangerous") than the "no/low stigma" and accordingly, we labeled this class as "moderate associative stigma". Finally, the high probability of endorsing "sometimes", "often" or "all the time" to items 1 and 2, and "strongly agree" or "slightly agree" to items 6, 7, 8, 9 and item 11 (IRP ranges from 0.66 to 0.91) were associated with class 3, which was labeled as "high associative stigma". Within these three class groups, 48.7%, 40.5% and 10.8% of the population comprised no/low, moderate and high associative stigma classes, respectively.

The results of the multinomial logistic regression for the moderate and high associative stigma groups, with low stigma as the reference group are presented in Table 4. We found that staff working at IMH for less than one year (p=0.040), and between six and ten years (p=0.029) were less likely to have moderate associative stigma (versus staff working at IMH for more than 10 years). Occupation was also a significant predictor; doctors (p=0.007) and nurses (p=0.006) were significantly more likely to experience moderate associative stigma compared to allied health staff. Factors associated with high associative stigma were lower education (p=0.042), Indian ethnicity (p=0.043) and being a nurse (p=0.001).

Table 5 shows the results from multiple linear regression analyses. After adjusting for socio-demographic variables, high associative stigma remained significantly associated with lower job satisfaction scores (p<0.0001).

DISCUSSION

There is paucity in the current literature which investigates associative stigma experienced by mental health professionals. This is the first study to examine associative stigma among mental health professionals using latent class analysis and endeavors to expand and build our knowledge and understanding of the patterns of associative stigma amongst each of the classes. The findings reveal that among the study sample, three distinct classes exist; no/low, moderate and high associative stigma which were associated with unique socio-demographic correlates. Moderate associative stigma was significantly associated with years of service and occupation, while high associative stigma was associated with Indian ethnicity, lower education and occupation.

Findings revealed that 48.7%, 40.5% and 10.8% of staff working at a psychiatric hospital experienced no/low, moderate and high associative stigma, respectively. Whilst almost half of the staff experienced no or low associative stigma (48.7%), the remaining experienced moderate or high associative stigma, which is of concern. The moderate associative stigma class comprised staff who were more likely to report higher response probabilities for the following items “People react negatively when they know they work in a mental health care setting”, “People make jokes about me for working in a mental health care setting”, “Once they know a person works in a mental health care setting, most people will take their opinions less seriously” and “Mental health work is dangerous”. These items are similar to those in the CASS scale which comprised items relating to the negative perceptions and stereotypes of mental healthcare, psychiatry and people with

mental illnesses and people's reluctance to disclose working in this field [15]. These items relate largely to how other people perceive them and how they react towards them as a result of their profession and therefore efforts to better educate the general population as well as interventions targeting medical and nursing students are needed to dispel such misconceptions and stigma surrounding psychiatry and mental health care **[21]**. High associative stigma comprised staff that were also more likely to endorse items about other people's reactions however it also encompassed items about the mental health profession including "The mental health profession lacks a scientific basis" and "Working in a mental health care setting does not require special skills". Given the higher positive endorsement of the latter items, this indicates that even among mental health professionals, there is a level of stigma, uncertainty and even negative perceptions relating to mental health care and psychiatry and similar findings have also been previously reported **[9,11].** It is therefore possible that a consequence of experiencing ongoing associative stigma, results in these staff holding more discriminatory views, whereby they internalize this stigma or may have higher perceived stigma. Efforts within mental health care are needed to build self-esteem and self-confidence, whilst at the same time, taking the opportunity to highlight success stories in mental health to the public more frequently **[22]**.

Various socio-demographic differences were associated with moderate and high associative stigma. For example, Indians (compared to Chinese) were nearly three times more likely to experience high associative stigma. Whilst it is difficult to postulate why this may be, some possible explanations are provided. Firstly, high associative stigma was associated with higher probability of endorsing positive responses to items relating to (i) how staff perceive the mental health profession and (ii) how people react towards them. Regarding the latter, we do not know about the specific people stigmatizing these staff and therefore gaining a greater understanding of the types of people that judge and stigmatize mental health professionals would allow future anti-stigma efforts to be targeted towards these population sub-groups. For the former (how staff perceive the mental health profession), this relates to the individual's own personal views, whereby they perceive the discipline lacks a scientific basis, the profession doesn't require special skills or that mental health care doesn't contribute to the health of people, families and communities in a meaningful way. This could be an embedded cultural belief where in India psychiatry is still not considered an important medical specialty due to societal apprehensions and ignorance **[23]**. This is further substantiated by a recent study among a general population sample in India which found that one third of participants believed that psychiatrists specialize in psychiatry because they are not good enough for other specialties [24]. Mental illness stigma

needs to be studied within its sociocultural context in order to understand its origins, meanings and consequences **[25]** and in doing so, this may provide great insight into the ethnic differences observed in relation to associative stigma.

Given the study sample comprised doctors, nurses and allied health professionals, the overwhelming majority were highly educated, with over 85% having a tertiary qualification or higher. Those with the least education, which still equates to approximately 10-11 years of education, were six times more likely to experience high associative stigma and these findings resonate with those of a recent study which also explored associative stigma among mental health professionals in China and the US [16]. Research locally and internationally has shown that those who are less educated tend to hold more stigmatizing views towards the mentally ill **[26,27,28].** Whilst these studies are related to stigma towards people with a mental illness and not stigma by association, the two are inter-related and therefore could explain this finding. Another possible explanation could be that those working in mental healthcare are perceived to not 'require special skills' and therefore those with lower education are predominantly working in this profession. Alternatively, given that high associative stigma was related to a higher likelihood of positively endorsing items such as "The mental health profession lacks a scientific basis" and "Working in a mental health care setting does not require special skills" this may suggest that staff with less education perceive that being highly educated is not essential to this profession.

The number of years of service in a mental health hospital was associated with moderate associative stigma. Staff working at the psychiatric hospital for less than one year and those with 6-10 years of service, were less likely to experience moderate associative stigma, compared to those with over 10 years of service, whilst no significant differences were observed for those with 1-5 years of service. For newer staff (less than one year), their association via a professional capacity with people who have a mental illness would be minimal compared to those with over 10 years of experience. Therefore they would have only been exposed to possible associative stigma for this short period and hence less likely to experience any form of stigma, discrimination or prejudice. It is difficult however to postulate why staff with 6-10 years of service would experience less moderate associative stigma, versus those with over 10 years of service. **Halter [8]** in her study among nurses found that age was positively correlated with viewing psychiatric nurses as skilled, logical, dynamic and or respected. The author speculated that years of experience increased the likelihood of contact with people with a mental illness, thus mediating the influence of stigmatizing attitudes **[29]**. We predicted, that as a result of working in mental healthcare for

an extended period, staff would no longer be confronted with associative stigma and people would be less likely to 'react negatively' or 'make jokes' about where they work, whilst at the same time they would be 'acclimatized' to working in this setting. It could also be a result of some form of 'stigma resistance', whereby these staff can resist or ignore the stigma associated with their profession, however this does not explain why staff with 6-10 years of service are less likely to experience associative stigma compared to those with over 10 years of service. Further research exploring the impact of the number of years or experience in mental health care and associative stigma are needed.

The strongest predictor of moderate and high associative stigma was occupation. Nurses were significantly more likely to experience both moderate and high associative stigma, while doctors were significantly more likely to experience moderate associative stigma, when compared to allied health staff. Numerous studies have recently investigated stigma towards mental health nursing **[13,30],** psychiatrists **[31,32]** and the discipline of psychiatry and mental health in general **[22,33]** which is often perpetuated by nurses, doctors, medical and nursing students and health professionals working in other sectors, as well as the general public **[29]**. Studies among medical students have shown that the overall status of psychiatry is low **[21]**, where perceived low prestige and low respect among other medical disciplines are among the main reasons for not choosing psychiatry **[34-38]**. Similarly, a recent study among nursing students in Singapore found that only 5.2% of students would 'definitely decide to do' psychiatric nursing **[39]**. A study among doctors which assessed reasons why they left the specialty they had initially chosen found that among psychiatrists, the most common reasons reported included the specialty's poor public image and the perceived lack of respect among other doctors **[40]**. It is therefore possible that for some doctors, psychiatry was not their first preference, whilst for others the sense of being 'looked down upon' by other health professionals resulted in increased associative stigma.

Several studies among nurses and nursing students have found that psychiatry is ranked as one of the least preferred, attractive and respected disciplines in nursing **[8,41]. Halter [8]** explored the characteristics attributed to nurses in multiple disciplines, where psychiatric nurses were often described as unskilled, illogical, idle and disrespected. Whilst it could not be concluded whether these attitudes and perceptions were a consequence of associative stigma, such perceptions about nurses working at the only tertiary psychiatric hospital in Singapore could explain why nurses were significantly more likely to experience associative stigma. An alternative explanation could be related to how nurses are perceived. Previous research in Singapore has shown that

the local population often possesses low perceptions of nurses **[42]**, which may further exacerbate the stigma they experience.

It is also possible that this stigma experienced by psychiatrists and nurses operates in two directions; the first being the stereotypic attitudes or perceptions projected out by them, whilst the second is the associated attributes projected on them, which they may internalize **[14]**. Irrespective of the type of stigma, it is important that mental health professionals are aware of this and how this may impact their role and work-related tasks. In order to address moderate and high associative stigma associated with nurses and psychiatrists, these mental health professionals need to explore and challenge such cases of stigma experienced by them. Associative stigma not only devalues the individual but also the profession as a whole and therefore mental health professionals play an important role in dispelling stigma related to mental illnesses **[14]**.

Associative stigma was found to be associated with job satisfaction. After adjusting for socio-demographic correlates, we found that high associative stigma was associated with poorer job satisfaction. **Verhaeghe and Bracke [10]** found associative stigma was associated with depersonalization and emotional exhaustion among mental health professionals in Belgium, with the latter leading to decreased job satisfaction. The consequences of stigma in relation to job satisfaction have been well documented. Similarly, associative stigma among mental health professionals, can contribute to job stress and poorer outcomes not only in terms of staff well-being but the quality of care provided to patients and therefore the implications can be detrimental to both staff and their patients. Due to the cross-sectional nature of this study, the relation between job satisfaction and associative stigma could be bi-directional and therefore exploring this association over time would be beneficial.

The findings of this study should be viewed in light of the following limitations. Firstly, at the time the study was conducted, there was no developed and validated psychometric associative stigma measure, and therefore items used to measure associative stigma were based on previous research. Whilst such items have previously been used to measure associative stigma among various health care professionals, the settings have varied and therefore a detailed pilot or expert review in the local setting, would have been beneficial. There are now psychometric instruments that do measure associative stigma such as the CASS, which have been validated in various populations and are contributing to what was an under researched field. This was a cross-sectional study among staff working at IMH and therefore these findings are not generalizable to

all mental health professionals in Singapore, nor could causal relationships be established. However, given that this hospital is the primary provider of tertiary psychiatric care in Singapore, and all staff included in the study are involved with the care of patients with a mental illness, it provides valuable insight into the stigma associated with the mental health profession. The study was limited to doctors, nurses and allied health staff and therefore associative stigma of other staff including health care attendants, patient services associates and administrative staff was not gathered and may differ. Data were not collected on response rates, but rather once the desired quota of nurses and allied health staff was reached (i.e 200 of each group) recruitment ceased, therefore it is difficult to ascertain the degree of selection bias. Furthermore, data was not collected on those people that were invited to participate but chose not to respond and therefore it is possible that responders and non-responders experiences of associative stigma may differ. The invitation emails were sent to eligible staff through their institution email addresses. Data collected were based on self-report and therefore respondents may have provided socially desirable responses or may not have felt comfortable disclosing possible stigma they may have experienced. Finally, it is important to acknowledge that stigma in general is a complex and multi-faceted construct which has been theorised and defined in many mays and can present in different forms such as personal stigma, perceived stigma, self-stigma, structural stigma or associative stigma. This in itself poses various challenges as there may be some overlap in these constructs and how they are measured.

These limitations notwithstanding, this is one of just a few studies to explore associative stigma among mental health professionals, and to our knowledge the only study to explore this within an multi-ethnic Asian setting, and has thus added to the existing sparse literature. Using latent class analysis, the current study has provided a greater understanding of the extent of associative stigma among psychiatrists, nurses and allied health staff working at a psychiatric hospital. A 3-class model of associative stigma was found to have the best fit, where classes were labeled as no/low, moderate and high associative stigma. Based on these classes, it would be beneficial to further explore this construct via longitudinal studies or repeatedly measuring associative stigma over time to compare outcomes such as quality of life and burnout, as well as different types of job satisfaction across the different classes in order to determine effective interventions to reduce associative stigma among mental health professionals. At the same time, there is also a scarcity of literature relating to the development and evaluation of interventions to combat stigma experienced by health professionals **[21]**. Research has however shown that increment or

improvement in knowledge as well as actual contact with people who have a mental illness can help to reduce stigma, whilst improving the image of psychiatry and psychiatrists **[22]**.

There is a need to further explore the outcomes of associative stigma, not just from the perspective of those experiencing this stigma (in this case mental health professionals) but the impact this stigma may have on their patients and potentially the wider community. Given that high associative stigma was associated with poorer job satisfaction, which has been shown to have poorer outcomes for patients **[10]**, the implications of this finding are not only important to the well-being of staff but also patients. As stigma towards people with a mental illness, psychiatrists, and the mental health profession is highly interrelated, the ongoing process and difficult task of combating stigma related to mental illnesses continues. Associative stigma has received comparatively little attention from empirical researchers and continued efforts to address this under-studied yet important construct in conjunction with future efforts to dispel many of these misconceptions are needed.

Word Count: 5482

DECLARATIONS

Ethics approval: Ethical approval was obtained from the Domain Specific Review Board of the National Healthcare Group, Singapore prior to the launch of the survey.

Patient consent: Obtained

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Competing interest: The authors declare they have no competing interests

Author contributions: LP developed the study design, collected and verified the data and wrote the manuscript. SC assisted with the data collection and verification and provided intellectual inputs to the manuscript. EA and QY analyzed and interpreted the data and provided intellectual inputs to the manuscript. BYC assisted with the set-up and monitored the online survey and provided intellectual inputs to the manuscript. JAV provided intellectual inputs into the study design and interpretation of the findings. SO and KLY provided intellectual inputs into the study design and provided inputs to the manuscript. HCC provided clinical inputs into the findings and edited the manuscript. SAC and MS assisted in study design, interpreted the data, and provided intellectual inputs on the manuscript. All authors read and approved the final manuscript.

Availability of data and materials: Data is not available for online access, however readers who wish to gain access to the data can write to the senior author Dr Mythily Subramaniam at mythily@imh.com.sg with their requests. Access can be granted subject to the Institutional Review Board (IRB) and the research collaborative agreement guidelines. This is a requirement mandated for this research study by our IRB and funders.

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Table 1: Characteristics of the study sample

Characteristics		n	%
Age (mean years, SD)		36.4	10.6
Minimum to Maximum		21 to	71
Gender	Female	291	63.0
	Male	171	37.0
Ethnicity	Chinese	278	60.2
	Malay	36	7.8
	Indian	64	13.8
	Filipino	59	12.8
	Myanmar	16	3.5
	Others	9	1.9
Marital status	Never married	205	44.4
	Ever married	257	55.6
Education level	Secondary/ ITE/'O' level	18	3.9
	'A' level/diploma	49	10.6
	Bachelor	241	52.2
	Master or above	154	33.3
Residential status	Singapore Citizen	320	69.2
	Permanent Resident	59	12.8
	Non Resident	83	18.0
Occupation	Doctor	58	12.6
	Nurse	201	43.5
	Allied Health	203	43.9
Years worked at Institute Of Mental Health	Less than 1 year	52	11.3
	1-5 years	195	42.2
	6-10 years	103	22.3
	More than 10 years	112	24.2
Job satisfaction (mean years, SD)		7.2	1.6
Minimum to Maximum		1 to	10

SD= standard deviation

Table 2: Model comparisons and fit indices

Classes	AIC	BIC	CAIC	ABIC	Entropy
2	711.02	806.14	829.14	733.14	0.77
3	617.74	**762.48**	797.48	651.40	0.80
4	575.42	769.79	816.79	620.63	0.78
5	571.02	815.02	874.02	627.77	0.79
6	589.06	882.69	953.69	657.35	0.68
7	549.33	892.58	975.58	629.16	0.78
8	550.76	943.64	1038.64	642.13	0.80
9	567.26	1009.77	1116.77	670.18	0.80

Note: Akaike information criterion (AIC), Bayesian information criterion (BIC), consistent AIC (CAIC), adjusted BIC (ABIC) and enthropy all measure model fit. These model comparison measurements were used for choosing the optimal number of classes in latent class analysis, where the models with the smallest values indicate a better fit.

Table 3: Three latent class model of associative stigma prevalence and item-response probabilities

Item	Statement	Endorsement rate** (n=462)	Latent class (Model 2) CLASS 1	Latent class (Model 2) CLASS 2	Latent class (Model 3) CLASS 1	Latent class (Model 3) CLASS 2	Latent class (Model 3) CLASS 3
					No/low	Moderate	High
			Prevalence				
			41.34% (n=191)	58.86% (n=271)	48.7% (n=225)	40.5% (n=187)	10.8% (n=50)
			Item response probabilities*				
1	People react negatively when they know I work in a mental health care setting	60.61	0.24	0.51	0.46	0.70	0.91
2	People make jokes about me for working in a mental health care setting	63.85	0.27	0.43	0.56	0.65	0.91
3	I feel ashamed to be working in a mental health care setting	4.76	0.89	1.00	0.00	0.00	0.39
4	I am reluctant to tell people I work in a mental health care setting	14.50	0.79	0.91	0.10	0.09	0.49
5	I have been treated unfairly by others when they learn I work in a mental health care setting	12.99	0.71	0.98	0.04	0.13	0.50
6	Most people think less of a person who works in a mental health care setting	28.14	0.97	0.17	0.04	0.86	0.77
7	Once they know a person works in a mental health care setting, most people will take their opinions less seriously	20.13	0.87	0.04	0.00	0.65	0.81
8	Mental health care contributes to the health of people, families, communities and society in unique and meaningful ways	91.99	0.95	0.96	0.08	0.15	0.60
9	The mental health profession lacks a scientific basis	14.94	0.48	0.18	0.16	0.27	0.79

10	Working in a mental health care setting does not require special skills	2.81	0.13	0.03	0.02	0.02	0.36
11	Mental health work is dangerous	40.69	0.79	0.50	0.45	0.59	0.66

*Item response probability values range from 0 to 1, where numbers closer to 0 represent a low probability of endorsing a specific item, whereas values closer to 1 represent a high probability of endorsing the item. **Endorsement rate was determined if respondents provided the following responses: sometimes, often, all the time, slightly agree or strongly agree.

Table 4: Socio-demographic and employment related correlates of associative stigma among mental health professionals versus the reference group

		Moderate Associative Stigma				High Associative Stigma			
		Odds Ratio	95% CI		p value	Odds Ratio	95% CI		p value
			Lower	Upper			Lower	Upper	
Age		0.98	0.95	1.00	0.092	0.98	0.94	1.02	0.345
Sex	Female	Ref							
	Male	1.23	0.78	1.94	0.369	1.18	0.57	2.43	0.655
Residency status	Singapore Citizen	Ref							
	Permanent Resident	1.34	0.64	2.82	0.443	0.72	0.21	2.48	0.607
	Non Resident	1.12	0.47	2.65	0.801	0.36	0.08	1.66	0.189
Ethnicity	Chinese	Ref							
	Malay	0.59	0.22	1.55	0.282	0.97	0.29	3.26	0.965
	Indian	1.61	0.80	3.27	0.186	**2.97**	**1.04**	**8.53**	**0.043**
	Filipino	0.88	0.31	2.45	0.802	3.00	0.63	14.38	0.170
	Myanmar	1.69	0.43	6.62	0.450	0.92	0.07	11.56	0.947
	Others	1.13	0.25	5.19	0.874	.	.	.	.
Marital status	Never married	Ref							
	Ever married	1.13	0.70	1.83	0.625	1.06	0.48	2.37	0.885
Education	Secondary/ 'O/N' level[a]	3.06	0.77	12.10	0.111	**6.18**	**1.07**	**35.89**	**0.042**
	'A' level[b] & diploma	1.61	0.62	4.21	0.333	2.50	0.61	10.28	0.203
	Bachelor	1.22	0.71	2.11	0.470	1.28	0.44	3.74	0.656
	Masters or above	Ref							
Occupation	Doctor	**2.74**	**1.31**	**5.71**	**0.007**	2.22	0.46	10.84	0.324
	Nurse	**2.44**	**1.29**	**4.64**	**0.006**	**6.62**	**2.23**	**19.63**	**0.001**
	Allied Health	Ref							
Years worked at IMH*	<1 year	**0.36**	**0.13**	**0.95**	**0.040**	0.23	0.03	1.71	0.151
	1-5 years	0.53	0.25	1.09	0.083	0.98	0.28	3.39	0.977
	6-10 years	**0.45**	**0.22**	**0.92**	**0.029**	0.79	0.24	2.55	0.689
	>10 years	Ref							

Ref= reference group CI= confidence interval
*Institute of Mental Health
a= 'O' and 'N' levels indicate10 and 11 years of education, respectively b= 'A' level indicates 12 years of education.

Table 5: Relationship between associative stigma and job satisfaction

Latent classes	n	Mean	SD	Model 1				Model 2			
				Beta coefficient	95% CI		p value	Adjusted Beta coefficient	95% CI		p value
					Lower	Upper			Lower	Upper	
No/low associative stigma	225	7.24	1.52	Ref.				Ref.			
Moderate associative stigma	187	7.26	1.51	0.02	-0.28	0.32	0.9132	-0.18	-0.49	0.12	0.2337
High associative stigma	50	6.46	1.79	-0.78	-1.26	-0.30	**0.0013**	-1.08	-1.57	-0.59	**<.0001**

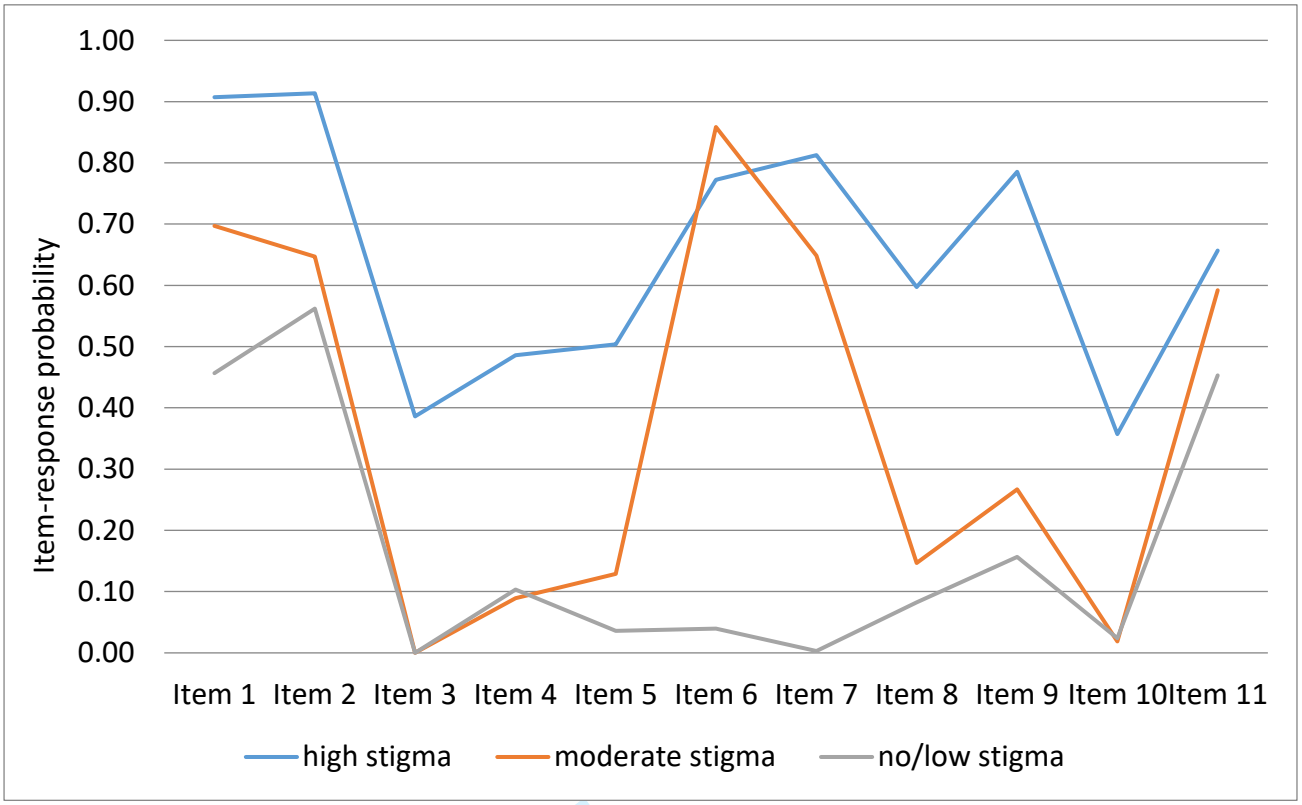
Ref= Reference group CI= confidence interval SD= standard deviation

Note: Job satisfaction scores were based on a single item (how satisfied are you with your job?) using a scale from 1 to 10, where 1 indicates very dissatisfied and 10 indicate very satisfied.

Model 1 = Simple linear regression

Model 2 = Multiple linear regression after adjusting for socio-demographic and employment related correlates including age, gender, ethnicity, residency status, marital status, education, occupation and years worked at Institute of Mental Health

Figure 1: 3-class unconditional latent class analysis of associative stigma



STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3
Objectives	3	State specific objectives, including any prespecified hypotheses	4
Methods			
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	6
Bias	9	Describe any efforts to address potential sources of bias	
Study size	10	Explain how the study size was arrived at	5
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	7
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	7
		(*b*) Describe any methods used to examine subgroups and interactions	
		(*c*) Explain how missing data were addressed	
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	
		(*e*) Describe any sensitivity analyses	
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	7-8
		(b) Give reasons for non-participation at each stage	
		(c) Consider use of a flow diagram	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	7-8
		(b) Indicate number of participants with missing data for each variable of interest	
Outcome data	15*	Report numbers of outcome events or summary measures	
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	8-9
		(*b*) Report category boundaries when continuous variables were categorized	
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	8-9
Discussion			
Key results	18	Summarise key results with reference to study objectives	9-12
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	13-14
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	14-15
Generalisability	21	Discuss the generalisability (external validity) of the study results	14
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	15

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Associative stigma among mental health professionals in Singapore: a cross-sectional study

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ABSTRACT

Objectives: (i) Investigate and explore whether different classes of associative stigma (the process by which a person experiences stigmatization as a result of an association with another stigmatized person) could be identified using latent class analysis; (ii) Determine the socio-demographic and employment related correlates of associative stigma; and (iii) Examine the relationship between associative stigma and job satisfaction, among mental health professionals.

Design: Cross-sectional online survey

Participants: Doctors, nurses and allied health staff, working in Singapore

Methods: Staff (n=462) completed an online survey which comprised 11 associative stigma items and also captured socio-demographic and job satisfaction related information. Latent class analysis was used to classify associative stigma upon patterns of observed categorical variables. Multinomial logistic regression was used to examine associations between socio-demographic and employment related factors and the different classes, while multiple linear regression analyses was used to examine the relationship between associative stigma and job satisfaction.

Results: The latent class analysis revealed that items formed a 3-class model where the classes were classified as 'no/low associative stigma', 'moderate associative stigma' and 'high associative stigma'. 48.7%, 40.5% and 10.8% of the population comprised no/low, moderate and high associative stigma classes, respectively. Multinomial logistic regression showed that years of service and occupation were significantly associated with moderate associative stigma, while factors associated with high associative stigma were education, ethnicity and occupation. Multiple linear regression analyses revealed that high associative stigma was significantly associated with lower job satisfaction scores.

Conclusion: Associative stigma was not uncommon among mental health professionals and was associated with various socio-demographic factors and poorer job satisfaction. Associative stigma has received comparatively little attention from empirical researchers and continued efforts to address this under-studied yet important construct in conjunction with future efforts to dispel misconceptions related to mental illnesses are needed.

Key words: associative stigma, latent class analysis, mental health, doctors, nurses, allied health staff

ARTICLE SUMMARY

Strengths and limitations of the study

- This is the first study to explore associative stigma among mental health professionals in Asia.
- Latent class analysis was used to classify associative stigma upon patterns of observed categorical variables.
- Multinomial logistic regression and multiple linear regression analyses were used to examine associations between socio-demographic factors and associative stigma and the relationship between associative stigma and job satisfaction.
- The study has some limitations including the cross-sectional design, it may be subjected to social desirability bias and it lacks generalisability due to inclusion criteria.

INTRODUCTION

Stigma is a complex and multi-faceted construct and often results from misunderstandings and perceptions society has about people with mental illnesses. Link and Phelan describe stigma as an overarching construct that exists when five interrelated components occur: (1) labelling, (2) negative attributes, (3) separation (4) status loss and (5) discrimination **[1]**. People with mental illnesses are frequently viewed or labeled as incompetent, irresponsible, unpredictable, and dangerous **[2]**. The consequences of this prejudice and discrimination can result in people with mental illnesses avoiding care and treatment, preferring denial or choosing not to disclose their condition **[3]**. This can then have damaging effects to other aspects of their lives including employment and job opportunities, relationships, housing opportunities, life satisfaction as well as self-esteem and self-efficacy **[4-7]**. The impact of stigma is significant not only for people with mental illnesses, but also their families, caregivers, and even health professionals providing mental health care.

To date there has been extensive literature surrounding stigma towards those with a mental illness however stigma does not only affect those who are being stigmatized but can also emanate from close association to these people. Associative stigma otherwise referred to as affiliate stigma, courtesy stigma or secondary stigma describes the process by which a person experiences stigmatization as a result of an association with another stigmatized person **[3,8]**. This stigma by association may be experienced by parents, spouses, siblings, children, friends, caregivers or co-workers of the stigmatized. More recently, there has been a growing interest in associative stigma experienced by mental health professionals, whereby they or the psychiatric

discipline is judged along the same stigmatizing stereotypes as their patients **[9]**. Negative and stigmatizing beliefs relating to mental health professionals not only discredit the valuable contributions these individuals make, but more importantly, these beliefs discredit the needs of people who access mental healthcare. Furthermore, negative perceptions of mental health professionals may in fact further exacerbate the stigma of mental illnesses **[8]**.

There is a dearth of literature concerning associative stigma experienced by mental health care professionals. **Verhaeghe and Bracke [10]** investigated the link between associative stigma and burnout and job satisfaction among mental health professionals in Belgium, and found that associative stigma was related to more depersonalization, more emotional exhaustion, and less job satisfaction. In a second study, **Ben Natan et al., [11]** compared attitudes and stigma among psychiatric and non-psychiatric nurses in Israel and found that non-psychiatric nurses held more stigmatizing views towards mental illnesses, individuals with a mental illness and the role of psychiatric nursing, although associative stigma did not differ between the two groups. A recent qualitative study among mental health clinicians from varying professional backgrounds including allied health staff, psychiatrists and law enforcement, found that these professionals commonly endorsed experiences of associative stigma from community members **[12]**.

There have also been a few earlier studies which have explored associative stigma among nurses **[8,13, 14]**, whilst to our knowledge, besides the qualitative study described above, there has only been one other study that included allied health staff working in mental health care **[10]**, and none of which have been undertaken in Asian settings. Less is therefore known about the extent of associative stigma amongst health professionals working in Asia and how this may compare to Western cultures. Despite the lack of research in this field, numerous studies have explored perceptions, attitudes and stigma towards psychiatry and psychiatrists among medical students in various parts of the world **[15]**. It is therefore possible that these negative perceptions are a result of public stigma, media portrayal of psychiatry and people with mental illness or even influences by medical teaching staff and such perceptions may contribute to associative stigma among mental health professionals.

At the time this study was conducted, there was no developed or validated tool to specifically measure associative stigma among mental health professionals and accordingly comparisons across studies are difficult. A recent study however has explored the validity and factor structure of associative stigma via the Clinician Associative Stigma Scale (CASS) **[16]**. Findings revealed

that amongst a sample of clinicians in the US, the CASS displayed good internal consistency and evidence of convergent validity and is an effective tool for measuring associative stigma among mental health professionals who work with people with serious mental illness. A second study, has also validated this scale amongst a sample of clinicians in China, with results revealing how cultural differences can impact associative stigma **[17]**.

The current study investigated associative stigma experienced by staff working at the Institute of Mental Health (IMH). IMH is the only tertiary psychiatric hospital in Singapore and encompasses a 2000 bed in-patient facility as well as specialist outpatient clinics and employs over 1500 doctors, nurses and allied health staff including psychologists, pharmacists, occupational therapists, physiotherapists, case managers and medical social workers. The aims of this study were to: (i) investigate and explore whether different classes of associative stigma could be identified using latent class analysis; (ii) determine the socio-demographic and employment related correlates of associative stigma; and (iii) examine the relationship between associative stigma and job satisfaction, among mental health professionals (doctors, nurses, psychologists, pharmacists, occupational therapists, physiotherapists, case managers, counselors and medical social workers) working at IMH.

In order to explore associative stigma in the current study, latent class analysis was used. Previous research has mainly been conducted to develop and validate stigma scales that measure stigma towards those with a mental illness. However, much of this research has validated these scales using a variable-centered approach, such as exploratory and confirmatory factor analysis. Such methods measure stigma as a total community or population score and this mean score may not give the full picture of the complex phenomena of stigma, which is often multi-faceted within individuals and populations **[18]**.

An alternative approach that can enhance understanding of the varying characteristics and levels of stigma within a population is latent class analysis. Latent class analysis is a respondent-centered approach that aims to group individuals into class groups based on their responses to a set of observed variables. It has been widely used in behavioural and social science research to uncover unobserved heterogeneity in a population and to find substantively meaningful groups of people that are similar in their responses to measured variables or growth trajectories **[19]**. Once individuals are assigned to their most likely class, based on their responses to observed variables,

it is then possible to examine other features such as socio-demographic correlates of each class, to determine predictors of these classes **[20]**.

METHODS

Participants and procedure

All doctors, nurses and allied health staff (psychologists, pharmacists, occupational therapists, physiotherapists, case managers and medical social workers) working at IMH were invited to participate in the survey, which was administered via Questionpro, an online survey application. Staff were informed of the study and the inclusion criteria via email and were sent a link to the online survey. Inclusion criteria required respondents to be: (i) Singapore citizens, permanent residents or foreigners with an employment or work permit; (ii) doctors, nurses, or allied health staff currently working at IMH and; (iii) aged 21 years and above. Staff who were willing to participate in the survey were required to read and accept an online consent form thus indicating their willingness and consent to participate in the study.

In order to explore employment related correlates such as occupation, it was estimated that a sample size of approximately 200 nurses and 200 allied health staff would be needed to explore differences in associative stigma amongst the two groups, where sample size calculations were performed using PS (power and sample size calculation) software for comparing means. Doctors were not included in the sample size calculation as at the time of the survey we knew that less than 100 doctors were currently employed at IMH and therefore a small number of doctors were expected to participate in the study. As reported in a previous study, Natan et al [11] found there to be significant mean difference in stigma scores between psychiatric and non psychiatric nurses, with psychiatric nurses having more positive attitudes towards mental illness (mean= 2.5; SD= 0.76 versus mean = 2.25; SD= 0.71), individuals with mental illness (mean= 3.33; SD= 0.6) versus mean= 3.57; SD=0.7) and the role of psychiatric nursing (mean=1.79; SD=0.6 versus mean=2.5; SD=0.5). Assuming a significance level at p value less than 0.05 and 80% power of the study, the minimum sample size required to replicate these analysis is 146 subjects per group (i.e., Group 1= nurses and Group 2= allied health (psychologists, pharmacists, occupational therapists, physiotherapists, case managers, counselors and medical social workers)). Taking into account a 40% rate of incomplete or partial completes a sample size of 200 per group (400 in total) was required. Accordingly, once this limit was reached, subsequent staff who wished to participate in the survey were sent a message informing them recruitment had ceased. Data were collected between February and April 2016, with a total of 470 participants completing the study; eight

cases were removed due to unreliable data or staff not meeting the inclusion criteria. Ethical approval was obtained from the Domain Specific Review Board of the National Healthcare Group, Singapore.

Patient and public involvement

There was no patient or public involvement in the study design, however staff at IMH will be informed of the study findings.

Measures

At the time this study was conducted, there was no developed and validated instrument which measured associative stigma. Two recent studies **[10,11]** derived items to measure associative stigma, based on their own literature reviews. Modified versions of some of these items were used and additional items were also added based on our own literature review. Five items were answered using a 5-point Likert scale (i.e Never, Rarely, Sometimes, Often, All the time) **[10]**:

1. People react negatively when they know I work in a mental health care setting[1]
2. People make jokes about me for working in a mental health care setting[1]
3. I feel ashamed to be working in a mental health care setting[1]
4. I am reluctant to tell people I work in a mental health care setting[1]
5. I have been treated unfairly by others when they learn I work in a mental health care setting.

An additional six items were answered using the following response categories and similar to those used by Ben Natan et al., **[11]**: Strongly agree (1); Slightly agree (2); Neither agree nor disagree (3); Slightly disagree (4); Strongly disagree (5). Items included:

1. Most people think less of a person who works in a mental health care setting
2. Once they know a person works in a mental health care setting, most people will take their opinions less seriously
3. Mental health care contributes to the health of people, families, communities and society in unique and meaningful ways[2]
4. The mental health profession lacks a scientific basis[2]
5. Working in a mental health care setting does not require special skills[2]
6. Mental health work is dangerous[2].

[1] Items were based on Verhaeghe et al., 2012

[2] Items were based on Ben Natan et al., 2015

Socio-demographic information was captured including age, gender, ethnicity, marital and residency status and education. In addition, staff were asked to indicate how long they had worked at IMH, their occupation, and to rate their job satisfaction on a scale from 1-10, where 1 indicated they were very dissatisfied and 10 indicated very satisfied.

Statistical analysis

All statistical analyses were done using SAS 9.2 (SAS Institute, Cary, North Carolina, USA). Mean and standard deviations (SD) were calculated for continuous variables, and frequencies and percentages for categorical variables. Missing data were very low (0.2 to 0.6%) and only in relation to associative stigma items. Listwise deletion methods were applied for all analyses.

Latent class analysis

Latent class analysis was used to classify associative stigma upon patterns of observed categorical variables. Latent class analysis is a "respondent-centered" approach that seeks to group individuals into "classes" based on their responses to a set of items **[20]**, and in this case, their responses to 11 associative stigma items. All associative stigma item responses were dichotomized such that for the first five questions, 'sometimes' 'often' and 'all the time' defined endorsement of the items; and for the remaining six questions, 'strongly agree' and 'slightly agree' defined endorsement. Responses 'rarely' and 'never' from the first set, and 'neither agree nor disagree' 'slightly disagree' and 'strongly disagree' from the second set defined non-endorsement. Latent class analysis is a mixture model that posits that there is an underlying unobserved categorical variable (i.e associative stigma) that divides a population into mutually exclusive and exhaustive latent classes. It is used to identify homogeneous subgroups, which share a common pattern of responses within a heterogeneous population. It relates a set of observed categorical variables to a set of latent variables. A latent class model with the optimal number of classes was determined using model fit statistics, including the likelihood ratio G^2, Akaike information criterion (AIC, smallest value preferred) and Bayesian information criterion (BIC, smallest value preferred), entropy (highest value preferred) values and interpretability of the derived classes **[21]**. All latent class analyses were conducted by PROC LCA in SAS 9.4 software.

Multinomial logistic regression

Multinomial logistic regression was used to examine associations between socio-demographic factors including age, gender, ethnicity, marital and residency status, education, years of employment and occupation and the different classes. Multinomial logistic regression analysis was chosen instead of ordinal regression as it is an appropriate statistical test when analyzing outcome variables with more than two categories. We found that the proportional odds assumption of the ordinal regression model has been violated using the Brant test [22]. These were tested at once and in a hierarchical fashion and were found to be significant. We also used multiple linear regression analyses to examine the relationship between associative stigma and job satisfaction with and without adjustment for socio-demographic correlates. Statistical significance were reported at $p < 0.05$.

RESULTS

The distribution of socio-demographic characteristics is presented in Table 1. The sample (n=462) comprised 58 doctors, 201 nurses and 203 allied health staff. The majority were female (63%), Chinese (60.2%) and had been working at IMH between one and five years (42.2%).

Eight unconditional models ranging from two to nine classes were compared to one another using fit statistics to determine the appropriate class structure (Table 2). The AIC value was lowest for the 7-class model (AIC=549.33) and the BIC value was lowest for the 3-class model (BIC=762.48), followed by 4-class model (BIC=769.79). The BIC value typically is considered a better measure of model fit because it penalizes for model complexity more than the AIC **[20]**. A careful examination of both the 3 and 4-class model solutions led us to select the 3-class model because it was more easily identified, had greater parsimony, and its parameter estimates presented a solution with a more interpretable and distinct set of classes than the 3-class model (Figure 1).

The parameter estimates depicted in Figure 1 and Table 3 provide the 3-class model of associative stigma prevalence and item-response probability (IRP). IRP values range from 0 to 1, where numbers closer to 0 represent a low probability of endorsing a specific associative stigma item, whereas values closer to 1 represent a high probability of endorsing the item. Each class then consists of different probabilities of endorsement for each of the 11 associative stigma items. For example, the first latent class is characterized by a low IRP of endorsing the following items: “I feel ashamed to be working in a mental health care setting”(Item 3), “I am reluctant to tell people I work in a mental health care setting” (Item 4), “I have been treated unfairly by others when they

learn I work in a mental health care setting" (Item 5), "Most people think less of a person who works in a mental health care setting" (Item 6), "Once they know a person works in a mental health care setting, most people will take their opinions less seriously" (Item 7), "Mental health care contributes to the health of people, families, communities and society in unique and meaningful ways" (Item 8), "The mental health profession lacks a scientific basis" (Item 9) and "Working in a mental health care setting does not require special skills" (Item 10). The IRP ranged from 0.001 to 0.16, thus we labeled this subgroup "no/low associative stigma". Class 2 comprised staff who were more likely to report higher response probabilities for items 1 ("People react negatively when they know they work in a mental health care setting"), 2 ("People make jokes about me for working in a mental health care setting"), 7 and 11 ("Mental health work is dangerous") than the "no/low stigma" and accordingly, we labeled this class as "moderate associative stigma" (IRP ranges from 0.59-0.70). Finally, the high probability of endorsing "sometimes", "often" or "all the time" to items 1 and 2, and "strongly agree" or "slightly agree" to items 6, 7, 8, 9 and item 11 (IRP ranges from 0.66 to 0.91) were associated with class 3, which was labeled as "high associative stigma". Within these three class groups, 48.7%, 40.5% and 10.8% of the population comprised no/low, moderate and high associative stigma classes, respectively.

The results of the multinomial logistic regression for the moderate and high associative stigma groups, with low stigma as the reference group are presented in Table 4. We found that staff working at IMH for less than one year (p=0.040), and between six and ten years (p=0.029) were less likely to have moderate associative stigma (versus staff working at IMH for more than 10 years). Occupation was also a significant predictor; doctors (p=0.007) and nurses (p=0.006) were significantly more likely to experience moderate associative stigma compared to allied health staff. Factors associated with high associative stigma were lower education (p=0.042), Indian ethnicity (p=0.043) and being a nurse (p=0.001).

Table 5 shows the results from multiple linear regression analyses. After adjusting for socio-demographic variables, high associative stigma remained significantly associated with lower job satisfaction scores (p<0.0001).

DISCUSSION

There is paucity in the current literature which investigates associative stigma experienced by mental health professionals. This is the first study to examine associative stigma among mental health professionals using latent class analysis and endeavors to expand and build our knowledge

and understanding of the patterns of associative stigma amongst each of the classes. The findings reveal that among the study sample, three distinct classes exist; no/low, moderate and high associative stigma which were associated with unique socio-demographic correlates. Moderate associative stigma was significantly associated with years of service and occupation, while high associative stigma was associated with Indian ethnicity, lower education and occupation.

Findings revealed that 48.7%, 40.5% and 10.8% of staff working at a psychiatric hospital experienced no/low, moderate and high associative stigma, respectively. Whilst almost half of the staff experienced no or low associative stigma (48.7%), the remaining experienced moderate or high associative stigma, which is of concern. The moderate associative stigma class comprised staff who were more likely to report higher response probabilities for the following items "People react negatively when they know they work in a mental health care setting", "People make jokes about me for working in a mental health care setting", "Once they know a person works in a mental health care setting, most people will take their opinions less seriously" and "Mental health work is dangerous". These items are similar to those in the CASS scale which comprised items relating to the negative perceptions and stereotypes of mental healthcare, psychiatry and people with mental illnesses and people's reluctance to disclose working in this field [15]. These items relate largely to how other people perceive them and how they react towards them as a result of their profession and therefore efforts to better educate the general population as well as interventions targeting medical and nursing students are needed to dispel such misconceptions and stigma surrounding psychiatry and mental health care **[23]**. High associative stigma comprised staff that were also more likely to endorse items about other people's reactions however it also encompassed items about the mental health profession including "The mental health profession lacks a scientific basis" and "Working in a mental health care setting does not require special skills". Given the higher positive endorsement of the latter items, this indicates that even among mental health professionals, there is a level of stigma, uncertainty and even negative perceptions relating to mental health care and psychiatry and similar findings have also been previously reported **[9,11].** It is therefore possible that a consequence of experiencing ongoing associative stigma, results in these staff holding more discriminatory views, whereby they internalize this stigma or may have higher perceived stigma. Efforts within mental health care are needed to build self-esteem and self-confidence, whilst at the same time, taking the opportunity to highlight success stories in mental health to the public more frequently **[24]**.

Various socio-demographic differences were associated with moderate and high associative stigma. For example, Indians (compared to Chinese) were nearly three times more likely to experience high associative stigma. Whilst it is difficult to postulate why this may be, some possible explanations are provided. Firstly, high associative stigma was associated with higher probability of endorsing positive responses to items relating to (i) how staff perceive the mental health profession and (ii) how people react towards them. Regarding the latter, we do not know about the specific people stigmatizing these staff and therefore gaining a greater understanding of the types of people that judge and stigmatize mental health professionals would allow future anti-stigma efforts to be targeted towards these population sub-groups. For the former (how staff perceive the mental health profession), this relates to the individual's own personal views, whereby they perceive the discipline lacks a scientific basis, the profession doesn't require special skills or that mental health care doesn't contribute to the health of people, families and communities in a meaningful way. This could be an embedded cultural belief where in India psychiatry is still not considered an important medical specialty due to societal apprehensions and ignorance **[25]**. This is further substantiated by a recent study among a general population sample in India which found that one third of participants believed that psychiatrists specialize in psychiatry because they are not good enough for other specialties **[26]**. Mental illness stigma needs to be studied within its sociocultural context in order to understand its origins, meanings and consequences **[27]** and in doing so, this may provide great insight into the ethnic differences observed in relation to associative stigma. Future interventions designed to address associative stigma among mental health professionals should consider the impact of sociocultural influences.

Given the study sample comprised doctors, nurses and allied health professionals, the overwhelming majority were highly educated, with over 85% having a tertiary qualification or higher. Those with the least education, which still equates to approximately 10-11 years of education, were six times more likely to experience high associative stigma and these findings resonate with those of a recent study which also explored associative stigma among mental health professionals in China and the US **[17]**. Research locally and internationally has shown that those who are less educated tend to hold more stigmatizing views towards the mentally ill **[28-30].** Whilst these studies are related to stigma towards people with a mental illness and not stigma by association, the two are inter-related and therefore could explain this finding. Another possible explanation could be that those working in mental healthcare are perceived to not 'require special skills' and therefore those with lower education are predominantly working in this profession. Alternatively, given that high associative stigma was related to a higher likelihood of positively

endorsing items such as “The mental health profession lacks a scientific basis” and “Working in a mental health care setting does not require special skills” this may suggest that staff with less education perceive that being highly educated is not essential to this profession.

The number of years of service in a mental health hospital was associated with moderate associative stigma. Staff working at the psychiatric hospital for less than one year and those with 6-10 years of service, were less likely to experience moderate associative stigma, compared to those with over 10 years of service, whilst no significant differences were observed for those with 1-5 years of service. For newer staff (less than one year), their association via a professional capacity with people who have a mental illness would be minimal compared to those with over 10 years of experience. Therefore they would have only been exposed to possible associative stigma for this short period and hence less likely to experience any form of stigma, discrimination or prejudice. It is difficult however to postulate why staff with 6-10 years of service would experience less moderate associative stigma, versus those with over 10 years of service. **Halter [8]** in her study among nurses found that age was positively correlated with viewing psychiatric nurses as skilled, logical, dynamic and or respected. The author speculated that years of experience increased the likelihood of contact with people with a mental illness, thus mediating the influence of stigmatizing attitudes **[31]**. We predicted, that as a result of working in mental healthcare for an extended period, staff would no longer be confronted with associative stigma and people would be less likely to ‘react negatively’ or ‘make jokes’ about where they work, whilst at the same time they would be ‘acclimatized’ to working in this setting. It could also be a result of some form of ‘stigma resistance’, whereby these staff can resist or ignore the stigma associated with their profession, however this does not explain why staff with 6-10 years of service are less likely to experience associative stigma compared to those with over 10 years of service. Further research exploring the impact of the number of years or experience in mental health care and associative stigma are needed.

The strongest predictor of moderate and high associative stigma was occupation. Nurses were significantly more likely to experience both moderate and high associative stigma, while doctors were significantly more likely to experience moderate associative stigma, when compared to allied health staff. Numerous studies have recently investigated stigma towards mental health nursing **[14,32],** psychiatrists **[33,34]** and the discipline of psychiatry and mental health in general **[24,35]** which is often perpetuated by nurses, doctors, medical and nursing students and health professionals working in other sectors, as well as the general public **[31]**. Studies among medical

students have shown that the overall status of psychiatry is low **[23]**, where perceived low prestige and low respect among other medical disciplines are among the main reasons for not choosing psychiatry **[36-40]**. Similarly, a recent study among nursing students in Singapore found that only 5.2% of students would 'definitely decide to do' psychiatric nursing **[41]**. A study among doctors which assessed reasons why they left the specialty they had initially chosen found that among psychiatrists, the most common reasons reported included the specialty's poor public image and the perceived lack of respect among other doctors **[42]**. It is therefore possible that for some doctors, psychiatry was not their first preference, whilst for others the sense of being 'looked down upon' by other health professionals resulted in increased associative stigma.

Several studies among nurses and nursing students have found that psychiatry is ranked as one of the least preferred, attractive and respected disciplines in nursing **[8,43]. Halter [8]** explored the characteristics attributed to nurses in multiple disciplines, where psychiatric nurses were often described as unskilled, illogical, idle and disrespected. Whilst it could not be concluded whether these attitudes and perceptions were a consequence of associative stigma, such perceptions about nurses working at the only tertiary psychiatric hospital in Singapore could explain why nurses were significantly more likely to experience associative stigma. An alternative explanation could be related to how nurses are perceived. Previous research in Singapore has shown that the local population often possesses low perceptions of nurses **[44]**, which may further exacerbate the stigma they experience.

It is also possible that this stigma experienced by psychiatrists and nurses operates in two directions; the first being the stereotypic attitudes or perceptions projected out by them, whilst the second is the associated attributes projected on them, which they may internalize **[14]**. Irrespective of the type of stigma, it is important that mental health professionals are aware of this and how this may impact their role and work-related tasks. In order to address moderate and high associative stigma associated with nurses and psychiatrists, these mental health professionals need to explore and challenge such cases of stigma experienced by them. Associative stigma not only devalues the individual but also the profession as a whole and therefore mental health professionals play an important role in dispelling stigma related to mental illnesses **[14]**.

Associative stigma was found to be associated with job satisfaction. After adjusting for socio-demographic correlates, we found that high associative stigma was associated with poorer job satisfaction. **Verhaeghe and Bracke [10]** found associative stigma was associated with

depersonalization and emotional exhaustion among mental health professionals in Belgium, with the latter leading to decreased job satisfaction. The consequences of stigma in relation to job satisfaction have been well documented. Similarly, associative stigma among mental health professionals, can contribute to job stress and poorer outcomes not only in terms of staff well-being but the quality of care provided to patients and therefore the implications can be detrimental to both staff and their patients. Due to the cross-sectional nature of this study, the relation between job satisfaction and associative stigma could be bi-directional and therefore exploring this association over time would be beneficial. Interventions exploring how associative stigma contributes to the development of emotional exhaustion, burnout and or job satisfaction and the impact this has for patients, the quality of care they receive and the relationship they have with mental health professionals are needed. Furthermore, developing programs with a particular focus on associative stigma and coping strategies to deal with this among mental health professionals would be beneficial [45].

The findings of this study should be viewed in light of the following limitations. Firstly, at the time the study was conducted, there was no developed and validated psychometric associative stigma measure, and therefore items used to measure associative stigma were based on previous research. Whilst such items have previously been used to measure associative stigma among various health care professionals, the settings have varied and therefore a detailed pilot or expert review in the local setting, would have been beneficial. There are now psychometric instruments that do measure associative stigma such as the CASS, which have been validated in various populations and are contributing to what was an under researched field. This was a cross-sectional study among staff working at IMH and therefore these findings are not generalizable to all mental health professionals in Singapore, nor could causal relationships be established. However, given that this hospital is the primary provider of tertiary psychiatric care in Singapore, and all staff included in the study are involved with the care of patients with a mental illness, it provides valuable insight into the stigma associated with the mental health profession. The study was limited to doctors, nurses and allied health staff and therefore associative stigma of other staff including health care attendants, patient services associates and administrative staff was not gathered and may differ. Whilst one of the primary aims was to explore differences in associative stigma between occupations, we did not include doctors in the sample size calculation. At the time of the survey, we knew that less than 100 doctors were working at IMH and therefore efforts were made to recruit as many doctors as possible, given the small numbers in comparison to numbers of nurses and allied health staff. Data were not collected on response rates, but rather

once the desired quota of nurses and allied health staff was reached (i.e 200 of each group) recruitment ceased, therefore it is difficult to ascertain the degree of selection bias. Furthermore, data was not collected on those people that were invited to participate but chose not to respond and therefore it is possible that responders and non-responders experiences of associative stigma may differ. The invitation emails were sent to eligible staff through their institution email addresses. Data collected were based on self-report and therefore respondents may have provided socially desirable responses or may not have felt comfortable disclosing possible stigma they may have experienced. Finally, it is important to acknowledge that stigma in general is a complex and multi-faceted construct which has been theorised and defined in many mays and can present in different forms such as personal stigma, perceived stigma, self-stigma, structural stigma or associative stigma. This in itself poses various challenges as there may be some overlap in these constructs and how they are measured.

These limitations notwithstanding, this is one of just a few studies to explore associative stigma among mental health professionals, and to our knowledge the only study to explore this within an multi-ethnic Asian setting, and has thus added to the existing sparse literature. Using latent class analysis, the current study has provided a greater understanding of the extent of associative stigma among psychiatrists, nurses and allied health staff working at a psychiatric hospital. A 3-class model of associative stigma was found to have the best fit, where classes were labeled as no/low, moderate and high associative stigma. Based on these classes, it would be beneficial to further explore this construct via longitudinal studies or repeatedly measuring associative stigma over time to compare outcomes such as quality of life and burnout, as well as different types of job satisfaction across the different classes in order to determine effective interventions to reduce associative stigma among mental health professionals. At the same time, there is also a scarcity of literature relating to the development and evaluation of interventions to combat stigma experienced by health professionals **[23]**. Research has however shown that increment or improvement in knowledge as well as actual contact with people who have a mental illness can help to reduce stigma, whilst improving the image of psychiatry and psychiatrists **[24]** and therefore future interventions addressing associative stigma should incorporate such strategies. Furthermore, in order to reduce stigma, interventions should also include information and education related to the stereotypes (e.g dangerousness) healthcare providers may experience, which can further exacerbate associative stigma.

There is a need to further explore the outcomes of associative stigma, not just from the

perspective of those experiencing this stigma (in this case mental health professionals) but the impact this stigma may have on their patients and potentially the wider community. Given that high associative stigma was associated with poorer job satisfaction, which has been shown to have poorer outcomes for patients **[10]**, the implications of this finding are not only important to the well-being of staff but also patients. As stigma towards people with a mental illness, psychiatrists, and the mental health profession is highly interrelated, the ongoing process and difficult task of combating stigma related to mental illnesses continues. Associative stigma has received comparatively little attention from empirical researchers and continued efforts to address this under-studied yet important construct in conjunction with future efforts to dispel many of these misconceptions are needed.

Word Count: 5848

DECLARATIONS

Ethics approval: Ethical approval was obtained from the Domain Specific Review Board of the National Healthcare Group, Singapore prior to the launch of the survey.

Patient consent: Obtained

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Author contributions: LP developed the study design, collected and verified the data and wrote the manuscript. SC assisted with the data collection and verification and provided intellectual inputs to the manuscript. EA and QY analyzed and interpreted the data and provided intellectual inputs to the manuscript. BYC assisted with the set-up and monitored the online survey and provided intellectual inputs to the manuscript. JAV provided intellectual inputs into the study design and interpretation of the findings. SO and KLY provided intellectual inputs into the study design and provided inputs to the manuscript. HCC provided clinical inputs into the findings and edited the manuscript. SAC and MS assisted in study design, interpreted the data, and provided intellectual inputs on the manuscript. All authors read and approved the final manuscript.

Availability of data and materials: Data is not available for online access, however readers who wish to gain access to the data can write to the senior author Dr Mythily Subramaniam at mythily@imh.com.sg with their requests. Access can be granted subject to the Institutional

Review Board (IRB) and the research collaborative agreement guidelines. This is a requirement mandated for this research study by our IRB and funders.

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Table 1: Characteristics of the study sample

Characteristics		**n**	**%**
Age (mean years, SD)		36.4	10.6
Minimum to Maximum		21 to	71
Gender	Female	291	63.0
	Male	171	37.0
Ethnicity	Chinese	278	60.2
	Malay	36	7.8
	Indian	64	13.8
	Filipino	59	12.8
	Myanmar	16	3.5
	Others	9	1.9
Marital status	Never married	205	44.4
	Ever married	257	55.6
Education level	Secondary/ ITE/'O' level	18	3.9
	'A' level/diploma	49	10.6
	Bachelor	241	52.2
	Master or above	154	33.3
Residential status	Singapore Citizen	320	69.2
	Permanent Resident	59	12.8
	Non Resident	83	18.0
Occupation	Doctor	58	12.6
	Nurse	201	43.5
	Allied Health	203	43.9
Years worked at Institute Of Mental Health	Less than 1 year	52	11.3
	1-5 years	195	42.2
	6-10 years	103	22.3
	More than 10 years	112	24.2
Job satisfaction (mean years, SD)		7.2	1.6
Minimum to Maximum		1 to	10

SD= standard deviation

Table 2: Model comparisons and fit indices

Classes	AIC	BIC	CAIC	ABIC	Entropy
2	711.02	806.14	829.14	733.14	0.77
3	617.74	**762.48**	797.48	651.40	0.80
4	575.42	769.79	816.79	620.63	0.78
5	571.02	815.02	874.02	627.77	0.79
6	589.06	882.69	953.69	657.35	0.68
7	549.33	892.58	975.58	629.16	0.78
8	550.76	943.64	1038.64	642.13	0.80
9	567.26	1009.77	1116.77	670.18	0.80

Note: Akaike information criterion (AIC), Bayesian information criterion (BIC), consistent AIC (CAIC), adjusted BIC (ABIC) and enthropy all measure model fit. These model comparison measurements were used for choosing the optimal number of classes in latent class analysis, where the models with the smallest values indicate a better fit.

Table 3: Three latent class model of associative stigma prevalence and item-response probabilities

			Latent class (Model 3)		
			CLASS 1	CLASS 2	CLASS 3
			No/low	Moderate	High
			Prevalence		
			48.7% (n=225)	40.5% (n=187)	10.8% (n=50)
Item	Statement	Endorsement rate** (n=462)	Item response probabilities*		
1	People react negatively when they know I work in a mental health care setting	60.61	0.46	0.70	0.91
2	People make jokes about me for working in a mental health care setting	63.85	0.56	0.65	0.91
3	I feel ashamed to be working in a mental health care setting	4.76	0.00	0.00	0.39
4	I am reluctant to tell people I work in a mental health care setting	14.50	0.10	0.09	0.49
5	I have been treated unfairly by others when they learn I work in a mental health care setting	12.99	0.04	0.13	0.50
6	Most people think less of a person who works in a mental health care setting	28.14	0.04	0.86	0.77
7	Once they know a person works in a mental health care setting, most people will take their opinions less seriously	20.13	0.00	0.65	0.81
8	Mental health care contributes to the health of people, families, communities and society in unique and meaningful ways	91.99	0.08	0.15	0.60
9	The mental health profession lacks a scientific basis	14.94	0.16	0.27	0.79
10	Working in a mental health care setting does not require special skills	2.81	0.02	0.02	0.36
11	Mental health work is dangerous	40.69	0.45	0.59	0.66

*Item response probability values range from 0 to 1, where numbers closer to 0 represent a low probability of endorsing a specific item, whereas values closer to 1 represent a high probability of endorsing the item. **Endorsement rate was determined if respondents provided the following responses: sometimes, often, all the time, slightly agree or strongly agree.

Table 4: Socio-demographic and employment related correlates of associative stigma among mental health professionals versus the reference group (no/low associative stigma)**

		Moderate Associative Stigma				High Associative Stigma			
		Odds Ratio	95% CI		p value	Odds Ratio	95% CI		p value
			Lower	Upper			Lower	Upper	
Age		0.98	0.95	1.00	0.092	0.98	0.94	1.02	0.345
Sex	Female (Ref)								
	Male	1.23	0.78	1.94	0.369	1.18	0.57	2.43	0.655
Residency status	Singapore Citizen (Ref)								
	Permanent Resident	1.34	0.64	2.82	0.443	0.72	0.21	2.48	0.607
	Non Resident	1.12	0.47	2.65	0.801	0.36	0.08	1.66	0.189
Ethnicity	Chinese (Ref)								
	Malay	0.59	0.22	1.55	0.282	0.97	0.29	3.26	0.965
	Indian	1.61	0.80	3.27	0.186	**2.97**	**1.04**	**8.53**	**0.043**
	Filipino	0.88	0.31	2.45	0.802	3.00	0.63	14.38	0.170
	Myanmar	1.69	0.43	6.62	0.450	0.92	0.07	11.56	0.947
	Others	1.13	0.25	5.19	0.874	.	.	.	.
Marital status	Never married (Ref)								
	Ever married	1.13	0.70	1.83	0.625	1.06	0.48	2.37	0.885
Education	Secondary/ 'O/N' level[a]	3.06	0.77	12.10	0.111	**6.18**	**1.07**	**35.89**	**0.042**
	'A' level[b] & diploma	1.61	0.62	4.21	0.333	2.50	0.61	10.28	0.203
	Bachelor	1.22	0.71	2.11	0.470	1.28	0.44	3.74	0.656
	Masters or above (Ref)								
Occupation	Doctor	**2.74**	**1.31**	**5.71**	**0.007**	2.22	0.46	10.84	0.324
	Nurse	**2.44**	**1.29**	**4.64**	**0.006**	**6.62**	**2.23**	**19.63**	**0.001**
	Allied Health (Ref)								
Years worked at IMH*	<1 year	**0.36**	**0.13**	**0.95**	**0.040**	0.23	0.03	1.71	0.151
	1-5 years	0.53	0.25	1.09	0.083	0.98	0.28	3.39	0.977
	6-10 years	**0.45**	**0.22**	**0.92**	**0.029**	0.79	0.24	2.55	0.689
	>10 years (Ref)								

Ref= reference group CI= confidence interval*Institute of Mental Health.
**Multinomial logistic regression model.
[a]= 'O' and 'N' levels indicate10 and 11 years of education, respectively.
[b]= 'A' level indicates 12 years of education.

Table 5: Relationship between associative stigma and job satisfaction

Latent classes	Job satisfaction			Model 1				Model 2			
	n	Mean	SD	Beta coefficient	95% CI		p value	Adjusted Beta coefficient	95% CI		p value
					Lower	Upper			Lower	Upper	
No/low associative stigma	225	7.24	1.52	Ref.				Ref.			
Moderate associative stigma	187	7.26	1.51	0.02	-0.28	0.32	0.9132	-0.18	-0.49	0.12	0.2337
High associative stigma	50	6.46	1.79	-0.78	-1.26	-0.30	**0.0013**	-1.08	-1.57	-0.59	**<.0001**

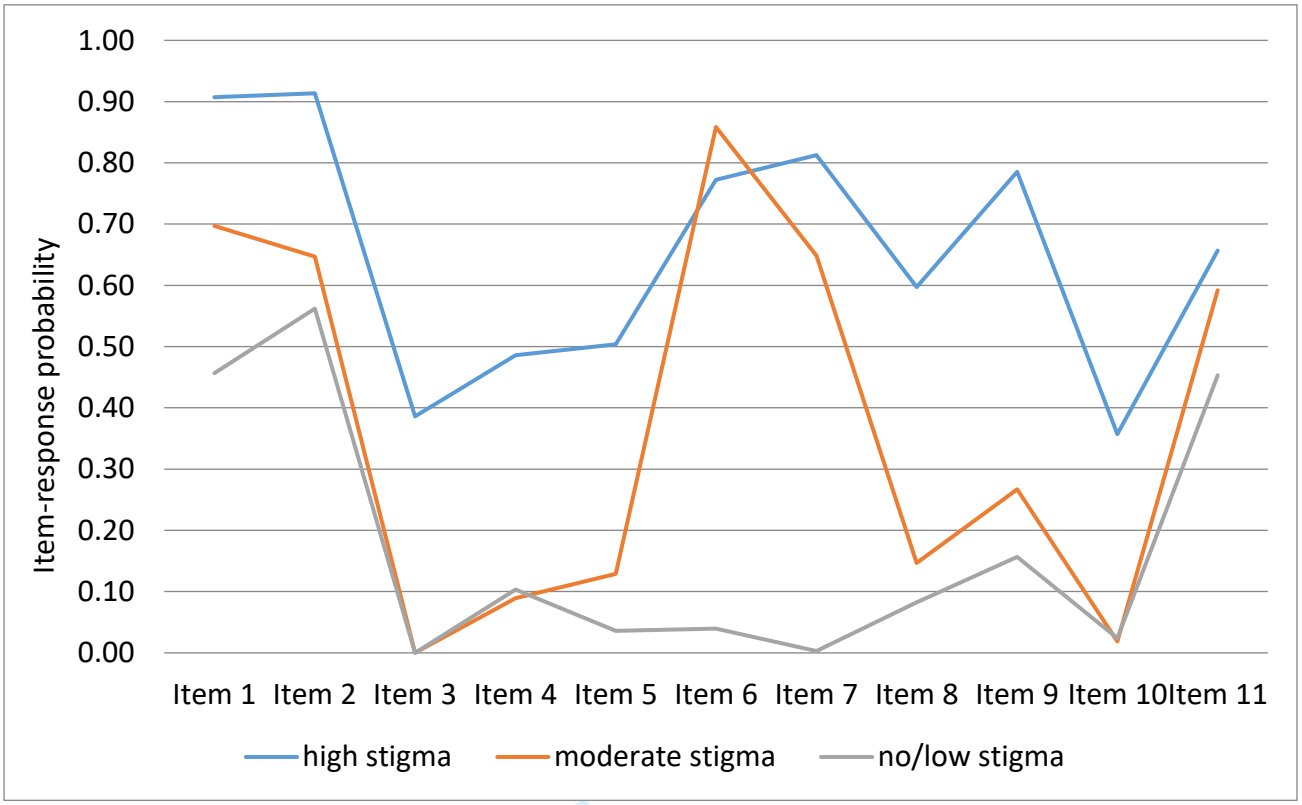
Ref= Reference group CI= confidence interval SD= standard deviation

Note: Job satisfaction scores were based on a single item (how satisfied are you with your job?) using a scale from 1 to 10, where 1 indicates very dissatisfied and 10 indicate very satisfied.

Model 1 = Simple linear regression

Model 2 = Multiple linear regression after adjusting for socio-demographic and employment related correlates including age, gender, ethnicity, residency status, marital status, education, occupation and years worked at Institute of Mental Health

Figure 1: 3-class unconditional latent class analysis of associative stigma



STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3
Objectives	3	State specific objectives, including any prespecified hypotheses	4
Methods			
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	6
Bias	9	Describe any efforts to address potential sources of bias	
Study size	10	Explain how the study size was arrived at	5
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	7
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	7
		(*b*) Describe any methods used to examine subgroups and interactions	
		(*c*) Explain how missing data were addressed	
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	
		(*e*) Describe any sensitivity analyses	
Results			

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	7-8
		(b) Give reasons for non-participation at each stage	
		(c) Consider use of a flow diagram	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	7-8
		(b) Indicate number of participants with missing data for each variable of interest	
Outcome data	15*	Report numbers of outcome events or summary measures	
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	8-9
		(*b*) Report category boundaries when continuous variables were categorized	
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	8-9
Discussion			
Key results	18	Summarise key results with reference to study objectives	9-12
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	13-14
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	14-15
Generalisability	21	Discuss the generalisability (external validity) of the study results	14
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	15

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.