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

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3 **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

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3 people who access mental healthcare. Furthermore, negative perceptions of mental health
4 professionals may in fact further exacerbate the stigma of mental illness [7].
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8 There is a dearth of literature concerning associative stigma experienced by mental health care
9 professionals. **Verhaeghe and Bracke [9]** investigated the link between associative stigma and
10 burnout and job satisfaction among mental health professionals in Belgium, and found that
11 associative stigma was related to more depersonalization, more emotional exhaustion, and less
12 job satisfaction. In a second study, **Ben Natan et al., [10]** compared attitudes and stigma among
13 psychiatric and non-psychiatric nurses in Israel and found that non-psychiatric nurses held more
14 stigmatizing views towards mental illness, individuals with mental illness and the role of
15 psychiatric nursing, although associative stigma did not differ between the two groups. A recent
16 qualitative study among mental health clinicians from varying professional backgrounds including
17 allied health staff, psychiatrists and law enforcement, found that these professionals commonly
18 endorsed experiences of associative stigma from community members [11]. There have also
19 been a few earlier studies which have explored associative stigma among nurses [7,12, 13], whilst
20 to our knowledge, in addition to the qualitative study described above, there has only been one
21 other study that included allied health staff working in mental health care [9], and none of which
22 have been undertaken in Asian settings. Less is therefore known about the extent of associative
23 stigma amongst health professionals working in Asia and how this may compare to Western
24 cultures.
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36 In order to bridge this gap and address this need, we have investigated associative stigma
37 experienced by staff working at the Institute of Mental Health (IMH). IMH is the only tertiary
38 psychiatric hospital in Singapore and encompasses a 2000 bed in-patient facility as well as
39 specialist outpatient clinics and employs over 1500 doctors, nurses and allied health staff
40 including psychologists, pharmacists, occupational therapists, physiotherapists, case managers
41 and medical social workers. The aims of this study were to: (i) investigate and explore the extent
42 of associative stigma; (ii) determine the socio-demographic correlates of associative stigma; and
43 (iii) examine the relationship between associative stigma and job satisfaction, among mental
44 health professionals (doctors, nurses, psychologists, pharmacists, occupational therapists,
45 physiotherapists, case managers, counselors and medical social workers) working at IMH.
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53 At the time this study was conducted, there was no developed or validated tool to measure
54 associative stigma and accordingly comparisons across studies are difficult. In order to explore
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3 associative stigma in the current study, latent class analysis was used. Previous research has
4 mainly been conducted to develop and validate stigma scales that measure stigma towards those
5 with a mental illness. However, much of this research has validated these scales using a variable-
6 centered approach, such as exploratory and confirmatory factor analysis. Such methods measure
7 stigma as a total community or population score and this mean score may not give the full picture
8 of the complex phenomena of stigma, which is often multi-faceted within individuals and
9 populations [14].
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16 An alternative approach that can enhance understanding of the varying characteristics and levels
17 of stigma within a population is latent class analysis. Latent class analysis is a respondent-
18 centered approach that aims to group individuals into class groups based on their responses to a
19 set of observed variables. It has been widely used in behavioural and social science research to
20 uncover unobserved heterogeneity in a population and to find substantively meaningful groups of
21 people that are similar in their responses to measured variables or growth trajectories [15]. Once
22 individuals are assigned to their most likely class, based on their responses to observed variables,
23 it is then possible to examine other features such as socio-demographic correlates of each class,
24 to determine predictors of these classes [16].
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31 **METHODS**

32 **Participants and procedure**

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34 Doctors, nurses and allied health staff (psychologists, pharmacists, occupational therapists,
35 physiotherapists, case managers and medical social workers) working at IMH were invited to
36 participate in the survey, which was administered via Questionpro, an online survey application.
37 Staff were informed of the study and the inclusion criteria via email and were sent a link to the
38 online survey. Inclusion criteria required respondents to be: (i) Singapore citizens, permanent
39 residents or foreigners with an employment or work permit; (ii) doctors, nurses, or allied health
40 staff currently working at IMH and; (iii) aged 21 years and above. Staff who were willing to
41 participate in the survey were required to read and accept an online consent form thus indicating
42 their willingness and consent to participate in the study.
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51 It was estimated that a sample size of approximately 200 nurses and 200 allied health staff would
52 be needed to explore differences in associative stigma amongst the two groups, where sample
53 size calculations were performed using PS (power and sample size calculation) software for
54 comparing means. Accordingly, once this limit was reached, subsequent staff who wished to
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3 participate in the survey were sent a message informing them recruitment had ceased. Data were
4 collected between February and April 2016, with a total of 470 participants completing the study;
5 eight cases were removed due to unreliable data or staff not meeting the inclusion criteria. Ethical
6 approval was obtained from the Domain Specific Review Board of the National Healthcare Group,
7 Singapore.
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11 12 **Measures**

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14 At the time this study was conducted, there was no developed and validated instrument which
15 measured associative stigma. Two recent studies [9,10] derived items to measure associative
16 stigma, based on their own literature reviews. Modified versions of some of these items were used
17 and additional items were also added based on our own literature review. Five items were
18 answered using a 5-point scale from never (1) to all the time (5) [9]:
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- 22 1. People react negatively when they know I work in a mental health care setting¹
- 23 2. People make jokes about me for working in a mental health care setting¹
- 24 3. I feel ashamed to be working in a mental health care setting¹
- 25 4. I am reluctant to tell people I work in a mental health care setting¹
- 26 5. I have been treated unfairly by others when they learn I work in a mental health care setting.
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31 An additional six items were answered using the following response categories and similar to
32 those used by Ben Natan et al., [10]: Strongly agree; Slightly agree; Neither agree nor disagree;
33 Slightly disagree; Strongly disagree. Items included:
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- 36 1. Most people think less of a person who works in that works a mental health care setting
- 37 2. Once they know a person works in a mental health care setting, most people will take their
38 opinions less seriously
- 39 3. Mental health care contributes to the health of people, families, communities and society in
40 unique and meaningful ways²
- 41 4. The mental health profession lacks a scientific basis²
- 42 5. Working in a mental health care setting does not require special skills²
- 43 6. Mental health work is dangerous².
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54 ¹ Items were based on Verhaeghe et al., 2012

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

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3 Socio-demographic information was captured including age, gender, ethnicity, marital and
4 residency status and education. In addition, staff were asked to indicate how long they had worked
5 at IMH, their occupation, and to rate their job satisfaction on a scale from 1-10, where 1 indicated
6 they were very dissatisfied and 10 indicated very satisfied.
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10 11 **Statistical analysis**

12 All statistical analyses were done using SAS 9.2 (SAS Institute, Cary, North Carolina, USA). Mean
13 and standard deviations were calculated for continuous variables, and frequencies and
14 percentages for categorical variables.
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18 19 *Latent class analysis*

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

42 Multinomial logistic regression was used to examine associations between socio-demographic
43 factors including age, gender, ethnicity, marital and residency status, education, years of
44 employment and occupation and the different classes. We also used multiple linear regression
45 analyses to examine the relationship between associative stigma and job satisfaction with and
46 without adjustment for socio-demographic correlates. Statistical significance were reported at p
47 <0.05 .
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53 **RESULTS**

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3 The distribution of socio-demographic characteristics is presented in Table 1. The sample (n=462)
4 comprised 58 doctors, 201 nurses and 203 allied health staff. The majority were female (63%),
5 Chinese (60.2%) and had been working at IMH between one and five years (42.2%).
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9 Eight unconditional models ranging from two to nine classes were compared to one another using
10 fit statistics to determine the appropriate class structure (Table 2). The AIC value was lowest for
11 the 4-class model (AIC=575.42) and the BIC value was lowest for the 3-class model
12 (BIC=762.48). The BIC value typically is considered a better measure of model fit because it
13 penalizes for model complexity more than the AIC [17]. A careful examination of both the 3 and
14 4-class model solutions led us to select the 3-class model because it was more easily identified,
15 had greater parsimony, and its parameter estimates presented a solution with a more
16 interpretable and distinct set of classes than the 4-class model (Figure 1).
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24 The parameter estimates depicted in Figure 1 and Table 3 provide the necessary information for
25 interpreting and labeling each class, with regards to item-response probability (IRP). IRP values
26 range from 0 to 1, where numbers closer to 0 represent a low probability of endorsing a specific
27 associative stigma item, whereas values closer to 1 represent a high probability of endorsing the
28 item. Each class then consists of different probabilities of endorsement for each of the 11
29 associative stigma items. For example, the first latent class is characterized by a low IRP of
30 endorsing the following items: “I feel ashamed to be working in a mental health care setting”(Item
31 3), “I am reluctant to tell people I work in a mental health care setting” (Item 4), “I have been
32 treated unfairly by others when they learn I work in a mental health care setting” (Item 5), “Most
33 people think less of a person who works in a mental health care setting” (Item 6), “Once they
34 know a person works in a mental health care setting, most people will take their opinions less
35 seriously” (Item 7), “Mental health care contributes to the health of people, families, communities
36 and society in unique and meaningful ways” (Item 8), “The mental health profession lacks a
37 scientific basis” (Item 9) and “Working in a mental health care setting does not require special
38 skills” (Item 10). The IRP ranged from 0.001 to 0.16, thus we labeled this subgroup “no/low
39 associative stigma”. Class 2 comprised staff who were more likely to report higher response
40 probabilities for items 1 (“People react negatively when they know they work in a mental health
41 care setting”), 2 (“People make jokes about me for working in a mental health care setting”), 7
42 and 11 (“Mental health work is dangerous”) than the “no/low stigma” and accordingly, we labeled
43 this class as “moderate associative stigma”. Finally, the high probability of endorsing “sometimes”,
44 “often” or “all the time” to items 1 and 2, and “strongly agree” or “slightly agree” to items 6, 7, 8, 9
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3 and item 11 (IRP ranges from 0.66 to 0.91) were associated with class 3, which was labeled
4 as “high associative stigma”. Within these three class groups, 48.7%, 40.5% and 10.8% of the
5 population comprised no/low, moderate and high associative stigma classes, respectively.
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9 The results of the multinomial logistic regression for the moderate and high associative stigma
10 groups, with low stigma as the reference group are presented in Table 4. We found that staff
11 working at IMH for less than one year ($p=0.040$), and between six and ten years ($p=0.029$) were
12 less likely to have moderate associative stigma (versus staff working at IMH for more than 10
13 years). Occupation was also a significant predictor; doctors ($p=0.007$) and nurses ($p=0.006$) were
14 significantly more likely to experience moderate associative stigma compared to allied health staff.
15 Factors associated with high associative stigma were lower education ($p=0.042$), Indian ethnicity
16 ($p=0.043$) and being a nurse ($p=0.001$).
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24 Table 5 shows the results from multiple linear regression analyses. After adjusting for socio-
25 demographic variables, high associative stigma remained significantly associated with lower job
26 satisfaction scores ($p<0.0001$).
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30 DISCUSSION

31 There is paucity in the current literature which investigates associative stigma experienced by
32 mental health professionals. This is the first study to examine associative stigma among mental
33 health professionals using latent class analysis and endeavors to expand and build our knowledge
34 and understanding of the patterns of associative stigma amongst each of the classes. The findings
35 reveal that three distinct classes exist; no/low, moderate and high associative stigma which were
36 associated with unique socio-demographic correlates. Moderate associative stigma was
37 significantly associated with years of service and occupation, while high associative stigma was
38 associated with Indian ethnicity, lower education and occupation.
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46 Findings revealed that 48.7%, 40.5% and 10.8% of staff working at a psychiatric hospital
47 experienced no/low, moderate and high associative stigma, respectively. Whilst almost half of the
48 staff experienced no or low associative stigma (48.7%), the remaining experienced moderate or
49 high associative stigma, which is of concern. Moderate associative stigma comprised staff who
50 were more likely to report higher response probabilities for the following items “People react
51 negatively when they know they work in a mental health care setting”, “People make jokes about
52 me for working in a mental health care setting”, “Once they know a person works in a mental
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3 health care setting, most people will take their opinions less seriously” and “Mental health work is
4 dangerous”. These items relate largely to how other people perceive them and how they react
5 towards them as a result of their profession and therefore efforts to better educate the general
6 population as well as interventions targeting medical and nursing students are needed to dispel
7 such misconceptions and stigma surrounding psychiatry and mental health care [18]. High
8 associative stigma comprised staff that were also more likely to endorse items about other
9 people’s reactions however it also encompassed items about the mental health profession
10 including “The mental health profession lacks a scientific basis” and “Working in a mental health
11 care setting does not require special skills”. Given the higher positive endorsement of the latter
12 items, this indicates that even among mental health professionals, there is a level of stigma,
13 uncertainty and even negative perceptions relating to mental health care and psychiatry and
14 similar findings have also been previously reported [8,10]. It is therefore possible that a
15 consequence of experiencing ongoing associative stigma, results in these staff holding more
16 discriminatory views, whereby they internalize this stigma or may have higher perceived stigma.
17 Efforts within mental health care are needed to build self-esteem and self-confidence, whilst at
18 the same time, taking the opportunity to highlight success stories in mental health to the public
19 more frequently [19].
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31 Various socio-demographic differences were associated with moderate and high associative
32 stigma. For example, Indians (compared to Chinese) were nearly three times more likely to
33 experience high associative stigma. Whilst it is difficult to postulate why this may be, some
34 possible explanations are provided. Firstly, high associative stigma was associated with higher
35 probability of endorsing positive responses to items relating to (i) how staff perceive the mental
36 health profession and (ii) how people react towards them. Regarding the latter, we do not know
37 about the specific people stigmatizing these staff and therefore gaining a greater understanding
38 of the types of people that judge and stigmatize mental health professionals would allow future
39 anti-stigma efforts to be targeted towards these population sub-groups. For the former (how staff
40 perceive the mental health profession), this relates to the individual’s own personal views,
41 whereby they perceive the discipline lacks a scientific basis, the profession doesn’t require special
42 skills or that mental health care doesn’t contribute to the health of people, families and
43 communities in a meaningful way. This could be an embedded cultural belief where in India
44 psychiatry is still not considered an important medical specialty due to various societal
45 apprehensions and ignorance [20]. Another possible explanation could be inferred from a recent
46 population wide study in Singapore which found personal stigma towards people with mental
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3 illness formed two distinct dimensions: 'weak-not-sick' and 'dangerous/unpredictable' [21].
4 Findings revealed that Indian ethnicity was significantly associated with higher scores on both
5 factors, highlighting that Indians hold more stigmatizing attitudes and therefore it is possible that
6 not only do they stigmatize more but hence perceive greater stigma. Mental illness stigma needs
7 to be studied within its sociocultural context in order to understand its origins, meanings and
8 consequences [22] and in doing so, this may provide great insight into the ethnic differences
9 observed in relation to associative stigma.
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16 Given the study sample comprised doctors, nurses and allied health professionals, the
17 overwhelming majority were highly educated, with over 85% having a tertiary qualification or
18 higher. Those with the least education, which still equates to approximately 10-11 years of
19 education, were six times more likely to experience high associative stigma. Research locally and
20 internationally has shown that those who are less educated tend to hold more stigmatizing views
21 towards the mentally ill [21,23,24]. Whilst these studies are related to stigma towards people with
22 mental illness and not stigma by association, the two are inter-related and therefore could explain
23 this finding. Another possible explanation could be that those working in mental healthcare are
24 perceived to not 'require special skills' and therefore those with lower education are predominantly
25 working in this profession. Alternatively, given that high associative stigma was related to a higher
26 likelihood of positively endorsing items such as "The mental health profession lacks a scientific
27 basis" and "Working in a mental health care setting does not require special skills" this may
28 suggest that staff with less education perceive that being highly educated is not essential to this
29 profession.
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40 The number of years of service in a mental health hospital was associated with moderate
41 associative stigma. Staff working at the psychiatric hospital for less than one year and those with
42 6-10 years of service, were less likely to experience moderate associative stigma, compared to
43 those with over 10 years of service, whilst no significant differences were observed for those with
44 1-5 years of service. For newer staff (less than one year), their association via a professional
45 capacity with people who have a mental illness would be minimal compared to those with over 10
46 years of experience. Therefore they would have only been exposed to possible associative stigma
47 for this short period and hence less likely to experience any form of stigma, discrimination or
48 prejudice. It is difficult however to postulate why staff with 6-10 years of service would experience
49 less moderate associative stigma, versus those with over 10 years of service. Halter [7] in her
50 study among nurses found that age was positively correlated with viewing psychiatric nurses as
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3 skilled, logical, dynamic and or respected. The author speculated that years of experience
4 increased the likelihood of contact with people with mental illness, thus mediating the influence of
5 stigmatizing attitudes [25]. We predicted, that as a result of working in mental healthcare for an
6 extended period, staff would no longer be confronted with associative stigma and people would
7 be less likely to 'react negatively' or 'make jokes' about where they work, whilst at the same time
8 they would be 'acclimatized' to working in this setting. It could also be a result of some form of
9 'stigma resistance', whereby these staff can resist or ignore the stigma associated with their
10 profession, however this does not explain why staff with 6-10 years of service are less likely to
11 experience associative stigma compared to those with over 10 years of service. Further research
12 exploring the impact of the number of years or experience in mental health care and associative
13 stigma are needed.
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22 The strongest predictor of moderate and high associative stigma was occupation. Nurses were
23 significantly more likely to experience both moderate and high associative stigma, while doctors
24 were significantly more likely to experience moderate associative stigma, when compared to allied
25 health staff. Numerous studies have recently investigated stigma towards mental health nursing
26 [12,26], psychiatrists [27,28] and the discipline of psychiatry and mental health in general [19,29]
27 which is often perpetuated by nurses, doctors, medical and nursing students and health
28 professionals working in other sectors, as well as the general public [25]. Studies among medical
29 students have shown that the overall status of psychiatry is low [18], where perceived low prestige
30 and low respect among other medical disciplines are among the main reasons for not choosing
31 psychiatry [30-34]. Similarly, a recent study among nursing students in Singapore found that only
32 5.2% of students would 'definitely decide to do' psychiatric nursing [35]. A study among doctors
33 which assessed reasons why they left the specialty they had initially chosen found that among
34 psychiatrists, the most common reasons reported included the specialty's poor public image and
35 the perceived lack of respect among other doctors [36]. It is therefore possible that for some
36 doctors, psychiatry was not their first preference, whilst for others the sense of being 'looked down
37 upon' by other health professionals resulted in increased associative stigma.
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49 Several studies among nurses and nursing students have found that psychiatry is ranked as one
50 of the least preferred, attractive and respected disciplines in nursing [7,37]. Halter [7] explored
51 the characteristics attributed to nurses in multiple disciplines, where psychiatric nurses were often
52 described as unskilled, illogical, idle and disrespected. Whilst it could not be concluded whether
53 these attitudes and perceptions were a consequence of associative stigma, such perceptions
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3 about nurses working at the only tertiary psychiatric hospital in Singapore could explain why
4 nurses were significantly more likely to experience associative stigma. An alternative explanation
5 could be related to how nurses are perceived. Previous research in Singapore has shown that
6 the local population often possesses low perceptions of nurses [38], which may further
7 exacerbate the stigma they experience.
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12 It is also possible that this stigma experienced by psychiatrists and nurses operates in two
13 directions; the first being the stereotypic attitudes or perceptions projected out by them, whilst the
14 second is the associated attributes projected on them, which they may internalize [13].
15 Irrespective of the type of stigma, it is important that mental health professionals are aware of this
16 and how this may impact their role and work-related tasks. In order to address moderate and high
17 associative stigma associated with nurses and psychiatrists, these mental health professionals
18 need to explore and challenge such cases of stigma experienced by them. Associative stigma not
19 only devalues the individual but also the profession as a whole and therefore mental health
20 professionals play an important role in dispelling mental illness stigma [13].
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28 Associative stigma was found to be associated with job satisfaction. After adjusting for socio-
29 demographic correlates, we found that high associative stigma was associated with poorer job
30 satisfaction. **Verhaeghe and Bracke [9]** found associative stigma was associated with
31 depersonalization and emotional exhaustion among mental health professionals in Belgium, with
32 the latter leading to decreased job satisfaction. The consequences of stigma in relation to job
33 satisfaction have been well documented. Similarly, associative stigma among mental health
34 professionals, can contribute to job stress and poorer outcomes not only in terms of staff well-
35 being but the quality of care provided to patients and therefore the implications can be detrimental
36 to both staff and their patients. Due to the cross-sectional nature of this study, the relation between
37 job satisfaction and associative stigma could be bi-directional and therefore exploring this
38 association over time would be beneficial.
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47 The findings of this study should be viewed in light of the following limitations. Firstly, at the time
48 the study was conducted, there was no developed and validated associative stigma measure,
49 and therefore items used to measure associative stigma were based on previous research. Whilst
50 such items have previously been used to measure associative stigma among various health care
51 professionals, the settings have varied and therefore a detailed pilot or expert review in the local
52 setting, would have been beneficial. Furthermore, given research has consistently highlighted the
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3 stigma associated with the mental healthcare profession, there is a need for a validated
4 instrument which measures this important construct. This was a cross-sectional study among staff
5 working at IMH and therefore these findings are not generalizable to all mental health
6 professionals in Singapore, nor could causal relationships be established. However, given that
7 this hospital is the primary provider of tertiary psychiatric care in Singapore, and all staff included
8 in the study are involved with the care of patients with mental illness, it provides valuable insight
9 into the stigma associated with the mental health profession. The study was limited to doctors,
10 nurses and allied health staff and therefore associative stigma of other staff including health care
11 attendants, patient services associates and administrative staff was not gathered and may differ.
12 Data were not collected on response rates, but rather once the desired quota of nurses and allied
13 health staff was reached (i.e 200 of each group) recruitment ceased, therefore it is difficult to
14 ascertain the degree of selection bias. Finally, data collected were based on self-report and
15 therefore respondents may have provided socially desirable responses or may not have felt
16 comfortable disclosing possible stigma they may have experienced.
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27 These limitations notwithstanding, this is one of just a few studies to explore associative stigma
28 among mental health professionals, and to our knowledge the only study to explore this within an
29 Asian setting, and has thus added to the existing sparse literature. Using latent class analysis,
30 the current study has provided a greater understanding of the extent of associative stigma among
31 psychiatrists, nurses and allied health staff working at a psychiatric hospital. A 3-class model of
32 associative stigma was found to have the best fit, where classes were labeled as no/low, moderate
33 and high associative stigma. Based on these classes, it would be beneficial to further explore this
34 construct via longitudinal studies or repeatedly measuring associative stigma over time to
35 compare outcomes across the different classes in order to determine effective interventions to
36 reduce associative stigma among mental health professionals. At the same time, there is also a
37 scarcity of literature relating to the development and evaluation of interventions to combat stigma
38 experienced by health professionals [18]. Research has however shown that increment or
39 improvement in knowledge as well as actual contact with people who have a mental illness can
40 help to reduce stigma, whilst improving the image of psychiatry and psychiatrists [19].
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50 There is a need to further explore the outcomes of associative stigma, not just from the
51 perspective of those experiencing this stigma (in this case mental health professionals) but the
52 impact this stigma may have on their patients and potentially the wider community. Given that
53 high associative stigma was associated with poorer job satisfaction, which has been shown to
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3 have poorer outcomes for patients [9], the implications of this finding are not only important to the
4 well-being of staff but also patients. In order to address and reduce associative stigma among
5 mental health professionals, we need to know more about those who are stigmatizing mental
6 health professionals, so targeted interventions towards these people or population sub-groups
7 can be implemented to help reduce associative stigma and stigma in general. As stigma towards
8 people with mental illness, psychiatrists, and the mental health profession is highly interrelated,
9 the ongoing process and difficult task of combating mental illness stigma continues. Associative
10 stigma has received comparatively little attention from empirical researchers and continued efforts
11 to address this under-studied yet important construct in conjunction with future efforts to dispel
12 many of these misconceptions are needed.
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20 **Word Count:** 4901
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22 **DECLARATIONS**

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25 **Ethics approval:** Ethical approval was obtained from the Domain Specific Review Board of the
26 National Healthcare Group, Singapore prior to the launch of the survey.
27

28 **Patient consent:** Obtained
29

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31 Health's National Medical Research Council under the Centre Grant Programme (Grant No.:
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33

34 **Competing interest:** The authors declare they have no competing interests
35

36 **Author contributions:** LP developed the study design, collected and verified the data and wrote
37 the manuscript. SC assisted with the data collection and verification and provided intellectual
38 inputs to the manuscript. EA and QY analyzed and interpreted the data and provided intellectual
39 inputs to the manuscript. BYC assisted with the set-up and monitored the online survey and
40 provided intellectual inputs to the manuscript. JAV provided intellectual inputs into the study
41 design and interpretation of the findings. SO and KLY provided intellectual inputs into the study
42 design and provided inputs to the manuscript. HCC provided clinical inputs into the findings and
43 edited the manuscript. SAC and MS assisted in study design, interpreted the data, and provided
44 intellectual inputs on the manuscript. All authors read and approved the final manuscript.
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50 **Availability of data and materials:** Data is not available for online access, however readers who
51 wish to gain access to the data can write to the senior author Dr Mythily Subramaniam at
52 mythily@imh.com.sg with their requests. Access can be granted subject to the Institutional
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3 Review Board (IRB) and the research collaborative agreement guidelines. This is a requirement
4 mandated for this research study by our IRB and funders.
5

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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 entropy 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 indicate 10 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

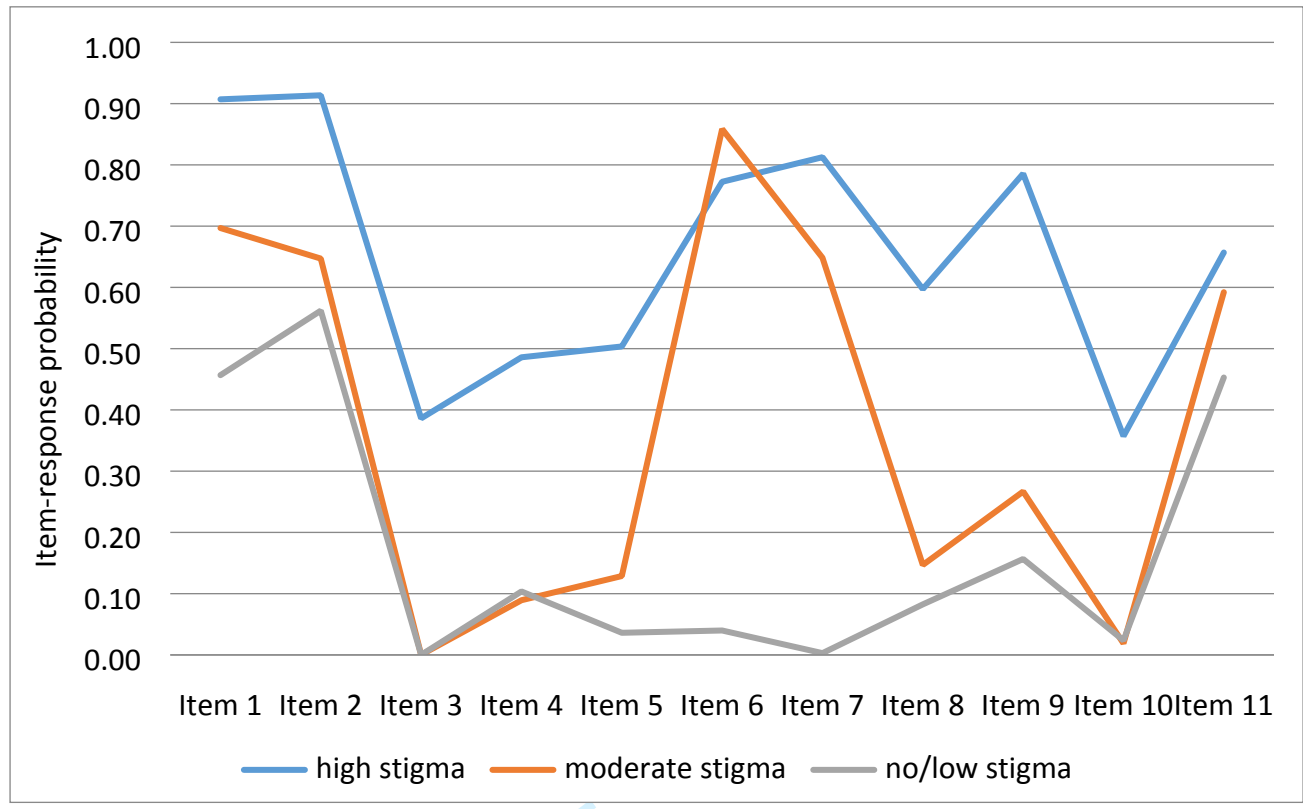
Model 2 = Multiple linear regression after adjusting for socio-demographic correlates including age, gender, ethnicity, residency status, marital status, education, occupation and years worked at Institute of Mental Health

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



review only

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 (b) Give reasons for non-participation at each stage (c) Consider use of a flow diagram	7-8
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders (b) Indicate number of participants with missing data for each variable of interest	7-8
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 (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	8-9
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

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3 discipline is judged along the same stigmatizing stereotypes as their patients [9]. Negative and
4 stigmatizing beliefs relating to mental health professionals not only discredit the valuable
5 contributions these individuals make, but more importantly, these beliefs discredit the needs of
6 people who access mental healthcare. Furthermore, negative perceptions of mental health
7 professionals may in fact further exacerbate the stigma of mental illnesses [8].
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12 There is a dearth of literature concerning associative stigma experienced by mental health care
13 professionals. **Verhaeghe and Bracke [10]** investigated the link between associative stigma and
14 burnout and job satisfaction among mental health professionals in Belgium, and found that
15 associative stigma was related to more depersonalization, more emotional exhaustion, and less
16 job satisfaction. In a second study, **Ben Natan et al., [11]** compared attitudes and stigma among
17 psychiatric and non-psychiatric nurses in Israel and found that non-psychiatric nurses held more
18 stigmatizing views towards mental illnesses, individuals with a mental illness and the role of
19 psychiatric nursing, although associative stigma did not differ between the two groups. A recent
20 qualitative study among mental health clinicians from varying professional backgrounds including
21 allied health staff, psychiatrists and law enforcement, found that these professionals commonly
22 endorsed experiences of associative stigma from community members [12]. There have also
23 been a few earlier studies which have explored associative stigma among nurses [8,13, 14], whilst
24 to our knowledge, besides the qualitative study described above, there has only been one other
25 study that included allied health staff working in mental health care [10], and none of which have
26 been undertaken in Asian settings. Less is therefore known about the extent of associative stigma
27 amongst health professionals working in Asia and how this may compare to Western cultures.
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39 At the time this study was conducted, there was no developed or validated tool to measure
40 associative stigma and accordingly comparisons across studies are difficult. A recent study
41 however has explored the validity and factor structure of associative stigma via the Clinician
42 Associative Stigma Scale (CASS) [15]. Findings revealed that amongst a sample of clinicians in
43 the US, the CASS displayed good internal consistency and evidence of convergent validity and
44 is an effective tool for measuring associative stigma among mental health professionals who work
45 with people with serious mental illness. A second study, has also validated this scale amongst a
46 sample of clinicians in China, with results revealing how cultural differences can impact
47 associative stigma [16].
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55 The current study investigated associative stigma experienced by staff working at the Institute of
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3 Mental Health (IMH). IMH is the only tertiary psychiatric hospital in Singapore and encompasses
4 a 2000 bed in-patient facility as well as specialist outpatient clinics and employs over 1500
5 doctors, nurses and allied health staff including psychologists, pharmacists, occupational
6 therapists, physiotherapists, case managers and medical social workers. The aims of this study
7 were to: (i) investigate and explore whether different classes of associative stigma could be
8 identified using latent class analysis; (ii) determine the socio-demographic and employment
9 related correlates of associative stigma; and (iii) examine the relationship between associative
10 stigma and job satisfaction, among mental health professionals (doctors, nurses, psychologists,
11 pharmacists, occupational therapists, physiotherapists, case managers, counselors and medical
12 social workers) working at IMH.
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21 In order to explore associative stigma in the current study, latent class analysis was used.
22 Previous research has mainly been conducted to develop and validate stigma scales that
23 measure stigma towards those with a mental illness. However, much of this research has
24 validated these scales using a variable-centered approach, such as exploratory and confirmatory
25 factor analysis. Such methods measure stigma as a total community or population score and this
26 mean score may not give the full picture of the complex phenomena of stigma, which is often
27 multi-faceted within individuals and populations [17].
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33 An alternative approach that can enhance understanding of the varying characteristics and levels
34 of stigma within a population is latent class analysis. Latent class analysis is a respondent-
35 centered approach that aims to group individuals into class groups based on their responses to a
36 set of observed variables. It has been widely used in behavioural and social science research to
37 uncover unobserved heterogeneity in a population and to find substantively meaningful groups of
38 people that are similar in their responses to measured variables or growth trajectories [18]. Once
39 individuals are assigned to their most likely class, based on their responses to observed variables,
40 it is then possible to examine other features such as socio-demographic correlates of each class,
41 to determine predictors of these classes [19].
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49 **METHODS**

50 **Participants and procedure**

51 All doctors, nurses and allied health staff (psychologists, pharmacists, occupational therapists,
52 physiotherapists, case managers and medical social workers) working at IMH were invited to
53 participate in the survey, which was administered via Questionpro, an online survey application.
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3 Staff were informed of the study and the inclusion criteria via email and were sent a link to the
4 online survey. Inclusion criteria required respondents to be: (i) Singapore citizens, permanent
5 residents or foreigners with an employment or work permit; (ii) doctors, nurses, or allied health
6 staff currently working at IMH and; (iii) aged 21 years and above. Staff who were willing to
7 participate in the survey were required to read and accept an online consent form thus indicating
8 their willingness and consent to participate in the study.
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14 In order to explore employment related correlates such as occupation, it was estimated that a
15 sample size of approximately 200 nurses and 200 allied health staff would be needed to explore
16 differences in associative stigma amongst the two groups, where sample size calculations were
17 performed using PS (power and sample size calculation) software for comparing means. As
18 reported in a previous study, Natan et al [11] found there to be significant mean difference in
19 stigma scores between psychiatric and non psychiatric nurses, with psychiatric nurses having
20 more positive attitudes towards mental illness (mean= 2.5; SD= 0.76 versus mean = 2.25; SD=
21 0.71), individuals with mental illness (mean= 3.33; SD= 0.6) versus mean= 3.57; SD=0.7) and the
22 role of psychiatric nursing (mean=1.79; SD=0.6 versus mean=2.5; SD=0.5). Assuming a
23 significance level at p value less than 0.05 and 80% power of the study, the minimum sample size
24 required to replicate these analysis is 146 subjects per group (i.e., Group 1= nurses and Group
25 2= allied health (psychologists, pharmacists, occupational therapists, physiotherapists, case
26 managers, counselors and medical social workers)). Taking into account a 40% rate of incomplete
27 or partial completion a sample size of 200 per group (400 in total) was required. Accordingly, once
28 this limit was reached, subsequent staff who wished to participate in the survey were sent a
29 message informing them recruitment had ceased. Data were collected between February and
30 April 2016, with a total of 470 participants completing the study; eight cases were removed due
31 to unreliable data or staff not meeting the inclusion criteria. Ethical approval was obtained from
32 the Domain Specific Review Board of the National Healthcare Group, Singapore.
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46 **Patient and public involvement**

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

52 At the time this study was conducted, there was no developed and validated instrument which
53 measured associative stigma. Two recent studies [10,11] derived items to measure associative
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3 stigma, based on their own literature reviews. Modified versions of some of these items were used
4 and additional items were also added based on our own literature review. Five items were
5 answered using a 5-point Likert scale (i.e Never, Rarely, Sometimes, Often, All the time) [10]:
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- 7 1. People react negatively when they know I work in a mental health care setting¹
- 8 2. People make jokes about me for working in a mental health care setting¹
- 9 3. I feel ashamed to be working in a mental health care setting¹
- 10 4. I am reluctant to tell people I work in a mental health care setting¹
- 11 5. I have been treated unfairly by others when they learn I work in a mental health care setting.
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17 An additional six items were answered using the following response categories and similar to
18 those used by Ben Natan et al., [11]: Strongly agree (1); Slightly agree (2); Neither agree nor
19 disagree (3); Slightly disagree (4); Strongly disagree (5). Items included:
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- 21 1. Most people think less of a person who works in a mental health care setting
- 22 2. Once they know a person works in a mental health care setting, most people will take their
23 opinions less seriously
- 24 3. Mental health care contributes to the health of people, families, communities and society in
25 unique and meaningful ways²
- 26 4. The mental health profession lacks a scientific basis²
- 27 5. Working in a mental health care setting does not require special skills²
- 28 6. Mental health work is dangerous².
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36 Socio-demographic information was captured including age, gender, ethnicity, marital and
37 residency status and education. In addition, staff were asked to indicate how long they had worked
38 at IMH, their occupation, and to rate their job satisfaction on a scale from 1-10, where 1 indicated
39 they were very dissatisfied and 10 indicated very satisfied.
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44 **Statistical analysis**

45 All statistical analyses were done using SAS 9.2 (SAS Institute, Cary, North Carolina, USA). Mean
46 and standard deviations were calculated for continuous variables, and frequencies and
47 percentages for categorical variables. Missing data were very low (0.2 to 0.6%) and only in relation
48 to associative stigma items. Listwise deletion methods were applied for all analyses.
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54 ¹ Items were based on Verhaeghe et al., 2012

55 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%).

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3 Eight unconditional models ranging from two to nine classes were compared to one another using
4 fit statistics to determine the appropriate class structure (Table 2). The AIC value was lowest for
5 the 7-class model (AIC=549.33) and the BIC value was lowest for the 3-class model
6 (BIC=762.48), followed by 4-class model (BIC=769.79). The BIC value typically is considered a
7 better measure of model fit because it penalizes for model complexity more than the AIC [20]. A
8 careful examination of both the 3 and 4-class model solutions led us to select the 3-class model
9 because it was more easily identified, had greater parsimony, and its parameter estimates
10 presented a solution with a more interpretable and distinct set of classes than the 3-class model
11 (Figure 1).
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19 The parameter estimates depicted in Figure 1 and Table 3 provide the 3-class model of
20 associative stigma prevalence and item-response probability (IRP). IRP values range from 0 to 1,
21 where numbers closer to 0 represent a low probability of endorsing a specific associative stigma
22 item, whereas values closer to 1 represent a high probability of endorsing the item. Each class
23 then consists of different probabilities of endorsement for each of the 11 associative stigma items.
24 For example, the first latent class is characterized by a low IRP of endorsing the following items:
25 “I feel ashamed to be working in a mental health care setting”(Item 3), “I am reluctant to tell people
26 I work in a mental health care setting” (Item 4), “I have been treated unfairly by others when they
27 learn I work in a mental health care setting” (Item 5), “Most people think less of a person who
28 works in a mental health care setting” (Item 6), “Once they know a person works in a mental health
29 care setting, most people will take their opinions less seriously” (Item 7), “Mental health care
30 contributes to the health of people, families, communities and society in unique and meaningful
31 ways” (Item 8), “The mental health profession lacks a scientific basis” (Item 9) and “Working in a
32 mental health care setting does not require special skills” (Item 10). The IRP ranged from 0.001
33 to 0.16, thus we labeled this subgroup “no/low associative stigma”. Class 2 comprised staff who
34 were more likely to report higher response probabilities for items 1 (“People react negatively when
35 they know they work in a mental health care setting”), 2 (“People make jokes about me for working
36 in a mental health care setting”), 7 and 11 (“Mental health work is dangerous”) than the “no/low
37 stigma” and accordingly, we labeled this class as “moderate associative stigma”. Finally, the high
38 probability of endorsing “sometimes”, “often” or “all the time” to items 1 and 2, and “strongly agree”
39 or “slightly agree” to items 6, 7, 8, 9 and item 11 (IRP ranges from 0.66 to 0.91) were associated
40 with class 3, which was labeled as “high associative stigma”. Within these three class groups,
41 48.7%, 40.5% and 10.8% of the population comprised no/low, moderate and high associative
42 stigma classes, respectively.
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5 The results of the multinomial logistic regression for the moderate and high associative stigma
6 groups, with low stigma as the reference group are presented in Table 4. We found that staff
7 working at IMH for less than one year ($p=0.040$), and between six and ten years ($p=0.029$) were
8 less likely to have moderate associative stigma (versus staff working at IMH for more than 10
9 years). Occupation was also a significant predictor; doctors ($p=0.007$) and nurses ($p=0.006$) were
10 significantly more likely to experience moderate associative stigma compared to allied health staff.
11 Factors associated with high associative stigma were lower education ($p=0.042$), Indian ethnicity
12 ($p=0.043$) and being a nurse ($p=0.001$).
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19 Table 5 shows the results from multiple linear regression analyses. After adjusting for socio-
20 demographic variables, high associative stigma remained significantly associated with lower job
21 satisfaction scores ($p<0.0001$).
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25 DISCUSSION

26 There is paucity in the current literature which investigates associative stigma experienced by
27 mental health professionals. This is the first study to examine associative stigma among mental
28 health professionals using latent class analysis and endeavors to expand and build our knowledge
29 and understanding of the patterns of associative stigma amongst each of the classes. The findings
30 reveal that among the study sample, three distinct classes exist; no/low, moderate and high
31 associative stigma which were associated with unique socio-demographic correlates. Moderate
32 associative stigma was significantly associated with years of service and occupation, while high
33 associative stigma was associated with Indian ethnicity, lower education and occupation.
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41 Findings revealed that 48.7%, 40.5% and 10.8% of staff working at a psychiatric hospital
42 experienced no/low, moderate and high associative stigma, respectively. Whilst almost half of the
43 staff experienced no or low associative stigma (48.7%), the remaining experienced moderate or
44 high associative stigma, which is of concern. The moderate associative stigma class comprised
45 staff who were more likely to report higher response probabilities for the following items “People
46 react negatively when they know they work in a mental health care setting”, “People make jokes
47 about me for working in a mental health care setting”, “Once they know a person works in a mental
48 health care setting, most people will take their opinions less seriously” and “Mental health work is
49 dangerous”. These items are similar to those in the CASS scale which comprised items relating
50 to the negative perceptions and stereotypes of mental healthcare, psychiatry and people with
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3 mental illnesses and people's reluctance to disclose working in this field [15]. These items relate
4 largely to how other people perceive them and how they react towards them as a result of their
5 profession and therefore efforts to better educate the general population as well as interventions
6 targeting medical and nursing students are needed to dispel such misconceptions and stigma
7 surrounding psychiatry and mental health care [21]. High associative stigma comprised staff that
8 were also more likely to endorse items about other people's reactions however it also
9 encompassed items about the mental health profession including "The mental health profession
10 lacks a scientific basis" and "Working in a mental health care setting does not require special
11 skills". Given the higher positive endorsement of the latter items, this indicates that even among
12 mental health professionals, there is a level of stigma, uncertainty and even negative perceptions
13 relating to mental health care and psychiatry and similar findings have also been previously
14 reported [9,11]. It is therefore possible that a consequence of experiencing ongoing associative
15 stigma, results in these staff holding more discriminatory views, whereby they internalize this
16 stigma or may have higher perceived stigma. Efforts within mental health care are needed to build
17 self-esteem and self-confidence, whilst at the same time, taking the opportunity to highlight
18 success stories in mental health to the public more frequently [22].
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30 Various socio-demographic differences were associated with moderate and high associative
31 stigma. For example, Indians (compared to Chinese) were nearly three times more likely to
32 experience high associative stigma. Whilst it is difficult to postulate why this may be, some
33 possible explanations are provided. Firstly, high associative stigma was associated with higher
34 probability of endorsing positive responses to items relating to (i) how staff perceive the mental
35 health profession and (ii) how people react towards them. Regarding the latter, we do not know
36 about the specific people stigmatizing these staff and therefore gaining a greater understanding
37 of the types of people that judge and stigmatize mental health professionals would allow future
38 anti-stigma efforts to be targeted towards these population sub-groups. For the former (how staff
39 perceive the mental health profession), this relates to the individual's own personal views,
40 whereby they perceive the discipline lacks a scientific basis, the profession doesn't require special
41 skills or that mental health care doesn't contribute to the health of people, families and
42 communities in a meaningful way. This could be an embedded cultural belief where in India
43 psychiatry is still not considered an important medical specialty due to societal apprehensions
44 and ignorance [23]. This is further substantiated by a recent study among a general population
45 sample in India which found that one third of participants believed that psychiatrists specialize in
46 psychiatry because they are not good enough for other specialties [24]. Mental illness stigma
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3 needs to be studied within its sociocultural context in order to understand its origins, meanings
4 and consequences [25] and in doing so, this may provide great insight into the ethnic differences
5 observed in relation to associative stigma.
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9 Given the study sample comprised doctors, nurses and allied health professionals, the
10 overwhelming majority were highly educated, with over 85% having a tertiary qualification or
11 higher. Those with the least education, which still equates to approximately 10-11 years of
12 education, were six times more likely to experience high associative stigma and these findings
13 resonate with those of a recent study which also explored associative stigma among mental health
14 professionals in China and the US [16]. Research locally and internationally has shown that those
15 who are less educated tend to hold more stigmatizing views towards the mentally ill [26,27,28].
16 Whilst these studies are related to stigma towards people with a mental illness and not stigma by
17 association, the two are inter-related and therefore could explain this finding. Another possible
18 explanation could be that those working in mental healthcare are perceived to not 'require special
19 skills' and therefore those with lower education are predominantly working in this profession.
20 Alternatively, given that high associative stigma was related to a higher likelihood of positively
21 endorsing items such as "The mental health profession lacks a scientific basis" and "Working in
22 a mental health care setting does not require special skills" this may suggest that staff with less
23 education perceive that being highly educated is not essential to this profession.
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35 The number of years of service in a mental health hospital was associated with moderate
36 associative stigma. Staff working at the psychiatric hospital for less than one year and those with
37 6-10 years of service, were less likely to experience moderate associative stigma, compared to
38 those with over 10 years of service, whilst no significant differences were observed for those with
39 1-5 years of service. For newer staff (less than one year), their association via a professional
40 capacity with people who have a mental illness would be minimal compared to those with over 10
41 years of experience. Therefore they would have only been exposed to possible associative stigma
42 for this short period and hence less likely to experience any form of stigma, discrimination or
43 prejudice. It is difficult however to postulate why staff with 6-10 years of service would experience
44 less moderate associative stigma, versus those with over 10 years of service. **Halter [8]** in her
45 study among nurses found that age was positively correlated with viewing psychiatric nurses as
46 skilled, logical, dynamic and or respected. The author speculated that years of experience
47 increased the likelihood of contact with people with a mental illness, thus mediating the influence
48 of stigmatizing attitudes [29]. We predicted, that as a result of working in mental healthcare for
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3 an extended period, staff would no longer be confronted with associative stigma and people would
4 be less likely to 'react negatively' or 'make jokes' about where they work, whilst at the same time
5 they would be 'acclimatized' to working in this setting. It could also be a result of some form of
6 'stigma resistance', whereby these staff can resist or ignore the stigma associated with their
7 profession, however this does not explain why staff with 6-10 years of service are less likely to
8 experience associative stigma compared to those with over 10 years of service. Further research
9 exploring the impact of the number of years or experience in mental health care and associative
10 stigma are needed.
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17 The strongest predictor of moderate and high associative stigma was occupation. Nurses were
18 significantly more likely to experience both moderate and high associative stigma, while doctors
19 were significantly more likely to experience moderate associative stigma, when compared to allied
20 health staff. Numerous studies have recently investigated stigma towards mental health nursing
21 **[13,30]**, psychiatrists **[31,32]** and the discipline of psychiatry and mental health in general **[22,33]**
22 which is often perpetuated by nurses, doctors, medical and nursing students and health
23 professionals working in other sectors, as well as the general public **[29]**. Studies among medical
24 students have shown that the overall status of psychiatry is low **[21]**, where perceived low prestige
25 and low respect among other medical disciplines are among the main reasons for not choosing
26 psychiatry **[34-38]**. Similarly, a recent study among nursing students in Singapore found that only
27 5.2% of students would 'definitely decide to do' psychiatric nursing **[39]**. A study among doctors
28 which assessed reasons why they left the specialty they had initially chosen found that among
29 psychiatrists, the most common reasons reported included the specialty's poor public image and
30 the perceived lack of respect among other doctors **[40]**. It is therefore possible that for some
31 doctors, psychiatry was not their first preference, whilst for others the sense of being 'looked down
32 upon' by other health professionals resulted in increased associative stigma.
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44 Several studies among nurses and nursing students have found that psychiatry is ranked as one
45 of the least preferred, attractive and respected disciplines in nursing **[8,41]**. Halter **[8]** explored
46 the characteristics attributed to nurses in multiple disciplines, where psychiatric nurses were often
47 described as unskilled, illogical, idle and disrespected. Whilst it could not be concluded whether
48 these attitudes and perceptions were a consequence of associative stigma, such perceptions
49 about nurses working at the only tertiary psychiatric hospital in Singapore could explain why
50 nurses were significantly more likely to experience associative stigma. An alternative explanation
51 could be related to how nurses are perceived. Previous research in Singapore has shown that
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3 the local population often possesses low perceptions of nurses [42], which may further
4 exacerbate the stigma they experience.
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8 It is also possible that this stigma experienced by psychiatrists and nurses operates in two
9 directions; the first being the stereotypic attitudes or perceptions projected out by them, whilst the
10 second is the associated attributes projected on them, which they may internalize [14].
11 Irrespective of the type of stigma, it is important that mental health professionals are aware of this
12 and how this may impact their role and work-related tasks. In order to address moderate and high
13 associative stigma associated with nurses and psychiatrists, these mental health professionals
14 need to explore and challenge such cases of stigma experienced by them. Associative stigma not
15 only devalues the individual but also the profession as a whole and therefore mental health
16 professionals play an important role in dispelling stigma related to mental illnesses [14].
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24 Associative stigma was found to be associated with job satisfaction. After adjusting for socio-
25 demographic correlates, we found that high associative stigma was associated with poorer job
26 satisfaction. **Verhaeghe and Bracke [10]** found associative stigma was associated with
27 depersonalization and emotional exhaustion among mental health professionals in Belgium, with
28 the latter leading to decreased job satisfaction. The consequences of stigma in relation to job
29 satisfaction have been well documented. Similarly, associative stigma among mental health
30 professionals, can contribute to job stress and poorer outcomes not only in terms of staff well-
31 being but the quality of care provided to patients and therefore the implications can be detrimental
32 to both staff and their patients. Due to the cross-sectional nature of this study, the relation between
33 job satisfaction and associative stigma could be bi-directional and therefore exploring this
34 association over time would be beneficial.
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43 The findings of this study should be viewed in light of the following limitations. Firstly, at the time
44 the study was conducted, there was no developed and validated psychometric associative stigma
45 measure, and therefore items used to measure associative stigma were based on previous
46 research. Whilst such items have previously been used to measure associative stigma among
47 various health care professionals, the settings have varied and therefore a detailed pilot or expert
48 review in the local setting, would have been beneficial. There are now psychometric instruments
49 that do measure associative stigma such as the CASS, which have been validated in various
50 populations and are contributing to what was an under researched field. This was a cross-
51 sectional study among staff working at IMH and therefore these findings are not generalizable to
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3 all mental health professionals in Singapore, nor could causal relationships be established.
4 However, given that this hospital is the primary provider of tertiary psychiatric care in Singapore,
5 and all staff included in the study are involved with the care of patients with a mental illness, it
6 provides valuable insight into the stigma associated with the mental health profession. The study
7 was limited to doctors, nurses and allied health staff and therefore associative stigma of other
8 staff including health care attendants, patient services associates and administrative staff was not
9 gathered and may differ. Data were not collected on response rates, but rather once the desired
10 quota of nurses and allied health staff was reached (i.e 200 of each group) recruitment ceased,
11 therefore it is difficult to ascertain the degree of selection bias. Furthermore, data was not
12 collected on those people that were invited to participate but chose not to respond and therefore
13 it is possible that responders and non-responders experiences of associative stigma may differ.
14 The invitation emails were sent to eligible staff through their institution email addresses. Data collected
15 were based on self-report and therefore respondents may have provided socially desirable
16 responses or may not have felt comfortable disclosing possible stigma they may have
17 experienced. Finally, it is important to acknowledge that stigma in general is a complex and multi-
18 faceted construct which has been theorised and defined in many ways and can present in different
19 forms such as personal stigma, perceived stigma, self-stigma, structural stigma or associative
20 stigma. This in itself poses various challenges as there may be some overlap in these constructs
21 and how they are measured.
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35 These limitations notwithstanding, this is one of just a few studies to explore associative stigma
36 among mental health professionals, and to our knowledge the only study to explore this within an
37 multi-ethnic Asian setting, and has thus added to the existing sparse literature. Using latent class
38 analysis, the current study has provided a greater understanding of the extent of associative
39 stigma among psychiatrists, nurses and allied health staff working at a psychiatric hospital. A 3-
40 class model of associative stigma was found to have the best fit, where classes were labeled as
41 no/low, moderate and high associative stigma. Based on these classes, it would be beneficial to
42 further explore this construct via longitudinal studies or repeatedly measuring associative stigma
43 over time to compare outcomes such as quality of life and burnout, as well as different types of
44 job satisfaction across the different classes in order to determine effective interventions to reduce
45 associative stigma among mental health professionals. At the same time, there is also a scarcity
46 of literature relating to the development and evaluation of interventions to combat stigma
47 experienced by health professionals [21]. Research has however shown that increment or
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3 improvement in knowledge as well as actual contact with people who have a mental illness can
4 help to reduce stigma, whilst improving the image of psychiatry and psychiatrists [22].
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8 There is a need to further explore the outcomes of associative stigma, not just from the
9 perspective of those experiencing this stigma (in this case mental health professionals) but the
10 impact this stigma may have on their patients and potentially the wider community. Given that
11 high associative stigma was associated with poorer job satisfaction, which has been shown to
12 have poorer outcomes for patients [10], the implications of this finding are not only important to
13 the well-being of staff but also patients. As stigma towards people with a mental illness,
14 psychiatrists, and the mental health profession is highly interrelated, the ongoing process and
15 difficult task of combating stigma related to mental illnesses continues. Associative stigma has
16 received comparatively little attention from empirical researchers and continued efforts to address
17 this under-studied yet important construct in conjunction with future efforts to dispel many of these
18 misconceptions are needed.
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27 **Word Count:** 5482
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30 **DECLARATIONS**

31 **Ethics approval:** Ethical approval was obtained from the Domain Specific Review Board of the
32 National Healthcare Group, Singapore prior to the launch of the survey.
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35 **Patient consent:** Obtained

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41 **Competing interest:** The authors declare they have no competing interests
42

43 **Author contributions:** LP developed the study design, collected and verified the data and wrote
44 the manuscript. SC assisted with the data collection and verification and provided intellectual
45 inputs to the manuscript. EA and QY analyzed and interpreted the data and provided intellectual
46 inputs to the manuscript. BYC assisted with the set-up and monitored the online survey and
47 provided intellectual inputs to the manuscript. JAV provided intellectual inputs into the study
48 design and interpretation of the findings. SO and KLY provided intellectual inputs into the study
49 design and provided inputs to the manuscript. HCC provided clinical inputs into the findings and
50 edited the manuscript. SAC and MS assisted in study design, interpreted the data, and provided
51 intellectual inputs on the manuscript. All authors read and approved the final manuscript.
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3 **Availability of data and materials:** Data is not available for online access, however readers who
4 wish to gain access to the data can write to the senior author Dr Mythily Subramaniam at
5 mythily@imh.com.sg with their requests. Access can be granted subject to the Institutional
6 Review Board (IRB) and the research collaborative agreement guidelines. This is a requirement
7 mandated for this research study by our IRB and funders.
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12 associative stigma questionnaire.
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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 entropy 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)		Latent class (Model 3)		
			CLASS 1	CLASS 2	CLASS 1	CLASS 2	CLASS 3
					No/low Prevalence	Moderate	High
			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.

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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 indicate 10 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		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.

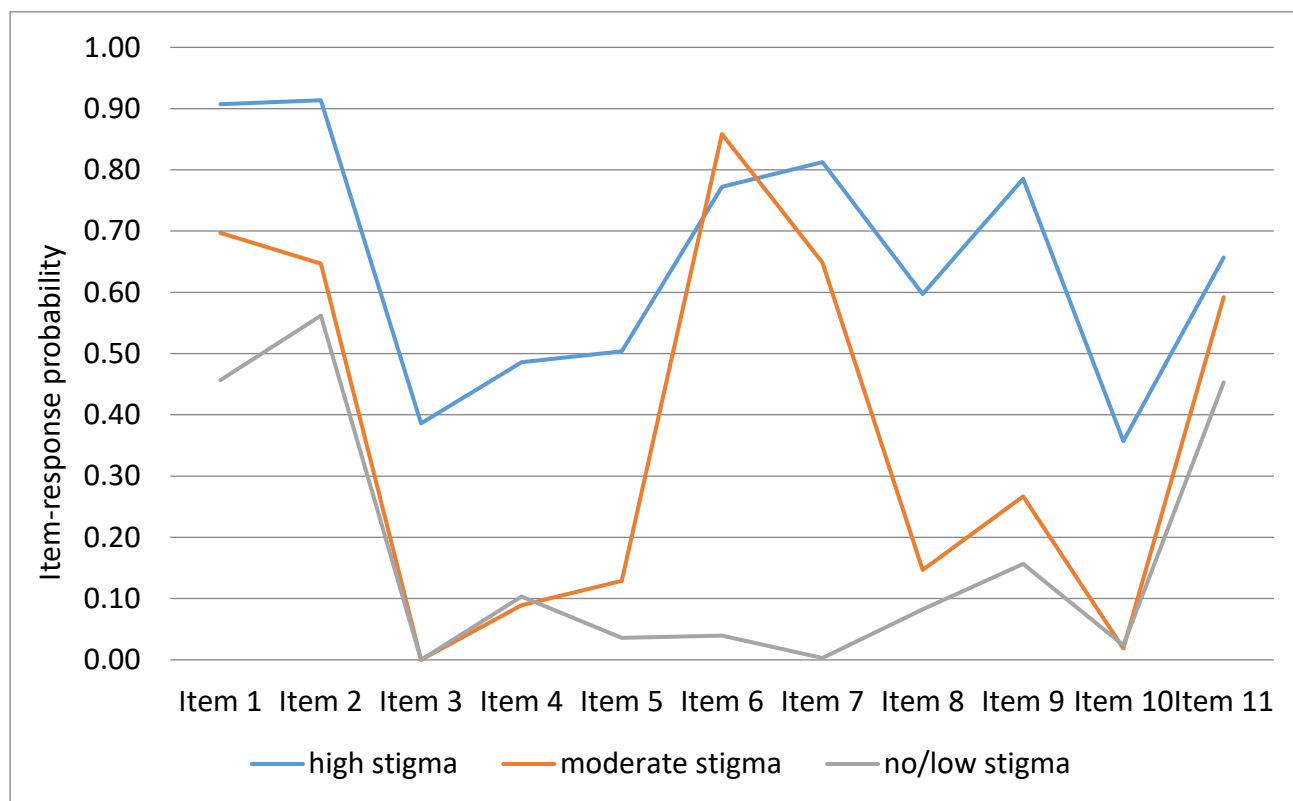
Model 1 = Simple linear regression

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

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



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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 (b) Give reasons for non-participation at each stage (c) Consider use of a flow diagram	7-8
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders (b) Indicate number of participants with missing data for each variable of interest	7-8
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 (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	8-9
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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3 **Title: Associative stigma among mental health professionals in Singapore: a cross-**
4 **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

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3 discipline is judged along the same stigmatizing stereotypes as their patients [9]. Negative and
4 stigmatizing beliefs relating to mental health professionals not only discredit the valuable
5 contributions these individuals make, but more importantly, these beliefs discredit the needs of
6 people who access mental healthcare. Furthermore, negative perceptions of mental health
7 professionals may in fact further exacerbate the stigma of mental illnesses [8].
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12 There is a dearth of literature concerning associative stigma experienced by mental health care
13 professionals. **Verhaeghe and Bracke [10]** investigated the link between associative stigma and
14 burnout and job satisfaction among mental health professionals in Belgium, and found that
15 associative stigma was related to more depersonalization, more emotional exhaustion, and less
16 job satisfaction. In a second study, **Ben Natan et al., [11]** compared attitudes and stigma among
17 psychiatric and non-psychiatric nurses in Israel and found that non-psychiatric nurses held more
18 stigmatizing views towards mental illnesses, individuals with a mental illness and the role of
19 psychiatric nursing, although associative stigma did not differ between the two groups. A recent
20 qualitative study among mental health clinicians from varying professional backgrounds including
21 allied health staff, psychiatrists and law enforcement, found that these professionals commonly
22 endorsed experiences of associative stigma from community members [12].
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32 There have also been a few earlier studies which have explored associative stigma among nurses
33 [8,13, 14], whilst to our knowledge, besides the qualitative study described above, there has only
34 been one other study that included allied health staff working in mental health care [10], and none
35 of which have been undertaken in Asian settings. Less is therefore known about the extent of
36 associative stigma amongst health professionals working in Asia and how this may compare to
37 Western cultures. Despite the lack of research in this field, numerous studies have explored
38 perceptions, attitudes and stigma towards psychiatry and psychiatrists among medical students
39 in various parts of the world [15]. It is therefore possible that these negative perceptions are a
40 result of public stigma, media portrayal of psychiatry and people with mental illness or even
41 influences by medical teaching staff and such perceptions may contribute to associative stigma
42 among mental health professionals.
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51 At the time this study was conducted, there was no developed or validated tool to specifically
52 measure associative stigma among mental health professionals and accordingly comparisons
53 across studies are difficult. A recent study however has explored the validity and factor structure
54 of associative stigma via the Clinician Associative Stigma Scale (CASS) [16]. Findings revealed
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3 that amongst a sample of clinicians in the US, the CASS displayed good internal consistency and
4 evidence of convergent validity and is an effective tool for measuring associative stigma among
5 mental health professionals who work with people with serious mental illness. A second study,
6 has also validated this scale amongst a sample of clinicians in China, with results revealing how
7 cultural differences can impact associative stigma **[17]**.
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12 The current study investigated associative stigma experienced by staff working at the Institute of
13 Mental Health (IMH). IMH is the only tertiary psychiatric hospital in Singapore and encompasses
14 a 2000 bed in-patient facility as well as specialist outpatient clinics and employs over 1500
15 doctors, nurses and allied health staff including psychologists, pharmacists, occupational
16 therapists, physiotherapists, case managers and medical social workers. The aims of this study
17 were to: (i) investigate and explore whether different classes of associative stigma could be
18 identified using latent class analysis; (ii) determine the socio-demographic and employment
19 related correlates of associative stigma; and (iii) examine the relationship between associative
20 stigma and job satisfaction, among mental health professionals (doctors, nurses, psychologists,
21 pharmacists, occupational therapists, physiotherapists, case managers, counselors and medical
22 social workers) working at IMH.
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31 In order to explore associative stigma in the current study, latent class analysis was used.
32 Previous research has mainly been conducted to develop and validate stigma scales that
33 measure stigma towards those with a mental illness. However, much of this research has
34 validated these scales using a variable-centered approach, such as exploratory and confirmatory
35 factor analysis. Such methods measure stigma as a total community or population score and this
36 mean score may not give the full picture of the complex phenomena of stigma, which is often
37 multi-faceted within individuals and populations **[18]**.
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44 An alternative approach that can enhance understanding of the varying characteristics and levels
45 of stigma within a population is latent class analysis. Latent class analysis is a respondent-
46 centered approach that aims to group individuals into class groups based on their responses to a
47 set of observed variables. It has been widely used in behavioural and social science research to
48 uncover unobserved heterogeneity in a population and to find substantively meaningful groups of
49 people that are similar in their responses to measured variables or growth trajectories **[19]**. Once
50 individuals are assigned to their most likely class, based on their responses to observed variables,
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3 it is then possible to examine other features such as socio-demographic correlates of each class,
4 to determine predictors of these classes [20].
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8 **METHODS**

9 **Participants and procedure**

10 All doctors, nurses and allied health staff (psychologists, pharmacists, occupational therapists,
11 physiotherapists, case managers and medical social workers) working at IMH were invited to
12 participate in the survey, which was administered via Questionpro, an online survey application.
13 Staff were informed of the study and the inclusion criteria via email and were sent a link to the
14 online survey. Inclusion criteria required respondents to be: (i) Singapore citizens, permanent
15 residents or foreigners with an employment or work permit; (ii) doctors, nurses, or allied health
16 staff currently working at IMH and; (iii) aged 21 years and above. Staff who were willing to
17 participate in the survey were required to read and accept an online consent form thus indicating
18 their willingness and consent to participate in the study.
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27 In order to explore employment related correlates such as occupation, it was estimated that a
28 sample size of approximately 200 nurses and 200 allied health staff would be needed to explore
29 differences in associative stigma amongst the two groups, where sample size calculations were
30 performed using PS (power and sample size calculation) software for comparing means. Doctors
31 were not included in the sample size calculation as at the time of the survey we knew that less
32 than 100 doctors were currently employed at IMH and therefore a small number of doctors were
33 expected to participate in the study. As reported in a previous study, Natan et al [11] found there
34 to be significant mean difference in stigma scores between psychiatric and non psychiatric nurses,
35 with psychiatric nurses having more positive attitudes towards mental illness (mean= 2.5; SD=
36 0.76 versus mean = 2.25; SD= 0.71), individuals with mental illness (mean= 3.33; SD= 0.6) versus
37 mean= 3.57; SD=0.7) and the role of psychiatric nursing (mean=1.79; SD=0.6 versus mean=2.5;
38 SD=0.5). Assuming a significance level at p value less than 0.05 and 80% power of the study, the
39 minimum sample size required to replicate these analysis is 146 subjects per group (i.e., Group
40 1= nurses and Group 2= allied health (psychologists, pharmacists, occupational therapists,
41 physiotherapists, case managers, counselors and medical social workers)). Taking into account
42 a 40% rate of incomplete or partial completes a sample size of 200 per group (400 in total) was
43 required. Accordingly, once this limit was reached, subsequent staff who wished to participate in
44 the survey were sent a message informing them recruitment had ceased. Data were collected
45 between February and April 2016, with a total of 470 participants completing the study; eight
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3 cases were removed due to unreliable data or staff not meeting the inclusion criteria. Ethical
4 approval was obtained from the Domain Specific Review Board of the National Healthcare Group,
5 Singapore.
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8 9 **Patient and public involvement**

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11 There was no patient or public involvement in the study design, however staff at IMH will be
12 informed of the study findings.
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15 16 **Measures**

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18 At the time this study was conducted, there was no developed and validated instrument which
19 measured associative stigma. Two recent studies [10,11] derived items to measure associative
20 stigma, based on their own literature reviews. Modified versions of some of these items were used
21 and additional items were also added based on our own literature review. Five items were
22 answered using a 5-point Likert scale (i.e Never, Rarely, Sometimes, Often, All the time) [10]:
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- 25 1. People react negatively when they know I work in a mental health care setting¹
- 26 2. People make jokes about me for working in a mental health care setting¹
- 27 3. I feel ashamed to be working in a mental health care setting¹
- 28 4. I am reluctant to tell people I work in a mental health care setting¹
- 29 5. I have been treated unfairly by others when they learn I work in a mental health care setting.

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35 An additional six items were answered using the following response categories and similar to
36 those used by Ben Natan et al., [11]: Strongly agree (1); Slightly agree (2); Neither agree nor
37 disagree (3); Slightly disagree (4); Strongly disagree (5). Items included:
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- 39 1. Most people think less of a person who works in a mental health care setting
- 40 2. Once they know a person works in a mental health care setting, most people will take their
41 opinions less seriously
- 42 3. Mental health care contributes to the health of people, families, communities and society in
43 unique and meaningful ways²
- 44 4. The mental health profession lacks a scientific basis²
- 45 5. Working in a mental health care setting does not require special skills²
- 46 6. Mental health work is dangerous².

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55 ¹ Items were based on Verhaeghe et al., 2012

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

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5 Socio-demographic information was captured including age, gender, ethnicity, marital and
6 residency status and education. In addition, staff were asked to indicate how long they had worked
7 at IMH, their occupation, and to rate their job satisfaction on a scale from 1-10, where 1 indicated
8 they were very dissatisfied and 10 indicated very satisfied.
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11 12 **Statistical analysis**

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14 All statistical analyses were done using SAS 9.2 (SAS Institute, Cary, North Carolina, USA). Mean
15 and standard deviations (SD) were calculated for continuous variables, and frequencies and
16 percentages for categorical variables. Missing data were very low (0.2 to 0.6%) and only in relation
17 to associative stigma items. Listwise deletion methods were applied for all analyses.
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20 21 22 *Latent class analysis*

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24 Latent class analysis was used to classify associative stigma upon patterns of observed
25 categorical variables. Latent class analysis is a “respondent-centered” approach that seeks to
26 group individuals into “classes” based on their responses to a set of items [20], and in this case,
27 their responses to 11 associative stigma items. All associative stigma item responses were
28 dichotomized such that for the first five questions, 'sometimes' 'often' and 'all the time' defined
29 endorsement of the items; and for the remaining six questions, 'strongly agree' and 'slightly agree'
30 defined endorsement. Responses 'rarely' and 'never' from the first set, and 'neither agree nor
31 disagree' 'slightly disagree' and 'strongly disagree' from the second set defined non-endorsement.
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33 Latent class analysis is a mixture model that posits that there is an
34 underlying unobserved categorical variable (i.e associative stigma) that divides a population into
35 mutually exclusive and exhaustive latent classes. It is used to identify homogeneous subgroups,
36 which share a common pattern of responses within a heterogeneous population. It relates a set
37 of observed categorical variables to a set of latent variables. A latent class model with the optimal
38 number of classes was determined using model fit statistics, including the likelihood ratio G^2 ,
39 Akaike information criterion (AIC, smallest value preferred) and Bayesian information criterion
40 (BIC, smallest value preferred), entropy (highest value preferred) values and interpretability of
41 the derived classes [21]. All latent class analyses were conducted by PROC LCA in SAS 9.4
42 software.
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52 53 54 *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

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3 learn I work in a mental health care setting” (Item 5), “Most people think less of a person who
4 works in a mental health care setting” (Item 6), “Once they know a person works in a mental health
5 care setting, most people will take their opinions less seriously” (Item 7), “Mental health care
6 contributes to the health of people, families, communities and society in unique and meaningful
7 ways” (Item 8), “The mental health profession lacks a scientific basis” (Item 9) and “Working in a
8 mental health care setting does not require special skills” (Item 10). The IRP ranged from 0.001
9 to 0.16, thus we labeled this subgroup “no/low associative stigma”. Class 2 comprised staff who
10 were more likely to report higher response probabilities for items 1 (“People react negatively when
11 they know they work in a mental health care setting”), 2 (“People make jokes about me for working
12 in a mental health care setting”), 7 and 11 (“Mental health work is dangerous”) than the “no/low
13 stigma” and accordingly, we labeled this class as “moderate associative stigma” (IRP ranges from
14 0.59-0.70). Finally, the high probability of endorsing “sometimes”, “often” or “all the time” to items
15 1 and 2, and “strongly agree” or “slightly agree” to items 6, 7, 8, 9 and item 11 (IRP ranges from
16 0.66 to 0.91) were associated with class 3, which was labeled as “high associative stigma”. Within
17 these three class groups, 48.7%, 40.5% and 10.8% of the population comprised no/low, moderate
18 and high associative stigma classes, respectively.
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30 The results of the multinomial logistic regression for the moderate and high associative stigma
31 groups, with low stigma as the reference group are presented in Table 4. We found that staff
32 working at IMH for less than one year ($p=0.040$), and between six and ten years ($p=0.029$) were
33 less likely to have moderate associative stigma (versus staff working at IMH for more than 10
34 years). Occupation was also a significant predictor; doctors ($p=0.007$) and nurses ($p=0.006$) were
35 significantly more likely to experience moderate associative stigma compared to allied health staff.
36 Factors associated with high associative stigma were lower education ($p=0.042$), Indian ethnicity
37 ($p=0.043$) and being a nurse ($p=0.001$).
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44 Table 5 shows the results from multiple linear regression analyses. After adjusting for socio-
45 demographic variables, high associative stigma remained significantly associated with lower job
46 satisfaction scores ($p<0.0001$).
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50 DISCUSSION

51 There is paucity in the current literature which investigates associative stigma experienced by
52 mental health professionals. This is the first study to examine associative stigma among mental
53 health professionals using latent class analysis and endeavors to expand and build our knowledge
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3 and understanding of the patterns of associative stigma amongst each of the classes. The findings
4 reveal that among the study sample, three distinct classes exist; no/low, moderate and high
5 associative stigma which were associated with unique socio-demographic correlates. Moderate
6 associative stigma was significantly associated with years of service and occupation, while high
7 associative stigma was associated with Indian ethnicity, lower education and occupation.
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12 Findings revealed that 48.7%, 40.5% and 10.8% of staff working at a psychiatric hospital
13 experienced no/low, moderate and high associative stigma, respectively. Whilst almost half of the
14 staff experienced no or low associative stigma (48.7%), the remaining experienced moderate or
15 high associative stigma, which is of concern. The moderate associative stigma class comprised
16 staff who were more likely to report higher response probabilities for the following items “People
17 react negatively when they know they work in a mental health care setting”, “People make jokes
18 about me for working in a mental health care setting”, “Once they know a person works in a mental
19 health care setting, most people will take their opinions less seriously” and “Mental health work is
20 dangerous”. These items are similar to those in the CASS scale which comprised items relating
21 to the negative perceptions and stereotypes of mental healthcare, psychiatry and people with
22 mental illnesses and people’s reluctance to disclose working in this field [15]. These items relate
23 largely to how other people perceive them and how they react towards them as a result of their
24 profession and therefore efforts to better educate the general population as well as interventions
25 targeting medical and nursing students are needed to dispel such misconceptions and stigma
26 surrounding psychiatry and mental health care [23]. High associative stigma comprised staff that
27 were also more likely to endorse items about other people’s reactions however it also
28 encompassed items about the mental health profession including “The mental health profession
29 lacks a scientific basis” and “Working in a mental health care setting does not require special
30 skills”. Given the higher positive endorsement of the latter items, this indicates that even among
31 mental health professionals, there is a level of stigma, uncertainty and even negative perceptions
32 relating to mental health care and psychiatry and similar findings have also been previously
33 reported [9,11]. It is therefore possible that a consequence of experiencing ongoing associative
34 stigma, results in these staff holding more discriminatory views, whereby they internalize this
35 stigma or may have higher perceived stigma. Efforts within mental health care are needed to build
36 self-esteem and self-confidence, whilst at the same time, taking the opportunity to highlight
37 success stories in mental health to the public more frequently [24].
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3 Various socio-demographic differences were associated with moderate and high associative
4 stigma. For example, Indians (compared to Chinese) were nearly three times more likely to
5 experience high associative stigma. Whilst it is difficult to postulate why this may be, some
6 possible explanations are provided. Firstly, high associative stigma was associated with higher
7 probability of endorsing positive responses to items relating to (i) how staff perceive the mental
8 health profession and (ii) how people react towards them. Regarding the latter, we do not know
9 about the specific people stigmatizing these staff and therefore gaining a greater understanding
10 of the types of people that judge and stigmatize mental health professionals would allow future
11 anti-stigma efforts to be targeted towards these population sub-groups. For the former (how staff
12 perceive the mental health profession), this relates to the individual's own personal views,
13 whereby they perceive the discipline lacks a scientific basis, the profession doesn't require special
14 skills or that mental health care doesn't contribute to the health of people, families and
15 communities in a meaningful way. This could be an embedded cultural belief where in India
16 psychiatry is still not considered an important medical speciality due to societal apprehensions
17 and ignorance [25]. This is further substantiated by a recent study among a general population
18 sample in India which found that one third of participants believed that psychiatrists specialize in
19 psychiatry because they are not good enough for other specialties [26]. Mental illness stigma
20 needs to be studied within its sociocultural context in order to understand its origins, meanings
21 and consequences [27] and in doing so, this may provide great insight into the ethnic differences
22 observed in relation to associative stigma. Future interventions designed to address associative
23 stigma among mental health professionals should consider the impact of sociocultural influences.
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38 Given the study sample comprised doctors, nurses and allied health professionals, the
39 overwhelming majority were highly educated, with over 85% having a tertiary qualification or
40 higher. Those with the least education, which still equates to approximately 10-11 years of
41 education, were six times more likely to experience high associative stigma and these findings
42 resonate with those of a recent study which also explored associative stigma among mental health
43 professionals in China and the US [17]. Research locally and internationally has shown that those
44 who are less educated tend to hold more stigmatizing views towards the mentally ill [28-30]. Whilst
45 these studies are related to stigma towards people with a mental illness and not stigma by
46 association, the two are inter-related and therefore could explain this finding. Another possible
47 explanation could be that those working in mental healthcare are perceived to not 'require special
48 skills' and therefore those with lower education are predominantly working in this profession.
49 Alternatively, given that high associative stigma was related to a higher likelihood of positively
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3 endorsing items such as “The mental health profession lacks a scientific basis” and “Working in
4 a mental health care setting does not require special skills” this may suggest that staff with less
5 education perceive that being highly educated is not essential to this profession.
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9 The number of years of service in a mental health hospital was associated with moderate
10 associative stigma. Staff working at the psychiatric hospital for less than one year and those with
11 6-10 years of service, were less likely to experience moderate associative stigma, compared to
12 those with over 10 years of service, whilst no significant differences were observed for those with
13 1-5 years of service. For newer staff (less than one year), their association via a professional
14 capacity with people who have a mental illness would be minimal compared to those with over 10
15 years of experience. Therefore they would have only been exposed to possible associative stigma
16 for this short period and hence less likely to experience any form of stigma, discrimination or
17 prejudice. It is difficult however to postulate why staff with 6-10 years of service would experience
18 less moderate associative stigma, versus those with over 10 years of service. **Halter [8]** in her
19 study among nurses found that age was positively correlated with viewing psychiatric nurses as
20 skilled, logical, dynamic and or respected. The author speculated that years of experience
21 increased the likelihood of contact with people with a mental illness, thus mediating the influence
22 of stigmatizing attitudes **[31]**. We predicted, that as a result of working in mental healthcare for
23 an extended period, staff would no longer be confronted with associative stigma and people would
24 be less likely to ‘react negatively’ or ‘make jokes’ about where they work, whilst at the same time
25 they would be ‘acclimatized’ to working in this setting. It could also be a result of some form of
26 ‘stigma resistance’, whereby these staff can resist or ignore the stigma associated with their
27 profession, however this does not explain why staff with 6-10 years of service are less likely to
28 experience associative stigma compared to those with over 10 years of service. Further research
29 exploring the impact of the number of years or experience in mental health care and associative
30 stigma are needed.
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46 The strongest predictor of moderate and high associative stigma was occupation. Nurses were
47 significantly more likely to experience both moderate and high associative stigma, while doctors
48 were significantly more likely to experience moderate associative stigma, when compared to allied
49 health staff. Numerous studies have recently investigated stigma towards mental health nursing
50 **[14,32]**, psychiatrists **[33,34]** and the discipline of psychiatry and mental health in general **[24,35]**
51 which is often perpetuated by nurses, doctors, medical and nursing students and health
52 professionals working in other sectors, as well as the general public **[31]**. Studies among medical
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3 students have shown that the overall status of psychiatry is low [23], where perceived low prestige
4 and low respect among other medical disciplines are among the main reasons for not choosing
5 psychiatry [36-40]. Similarly, a recent study among nursing students in Singapore found that only
6 5.2% of students would 'definitely decide to do' psychiatric nursing [41]. A study among doctors
7 which assessed reasons why they left the specialty they had initially chosen found that among
8 psychiatrists, the most common reasons reported included the specialty's poor public image and
9 the perceived lack of respect among other doctors [42]. It is therefore possible that for some
10 doctors, psychiatry was not their first preference, whilst for others the sense of being 'looked down
11 upon' by other health professionals resulted in increased associative stigma.
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19 Several studies among nurses and nursing students have found that psychiatry is ranked as one
20 of the least preferred, attractive and respected disciplines in nursing [8,43]. Halter [8] explored
21 the characteristics attributed to nurses in multiple disciplines, where psychiatric nurses were often
22 described as unskilled, illogical, idle and disrespected. Whilst it could not be concluded whether
23 these attitudes and perceptions were a consequence of associative stigma, such perceptions
24 about nurses working at the only tertiary psychiatric hospital in Singapore could explain why
25 nurses were significantly more likely to experience associative stigma. An alternative explanation
26 could be related to how nurses are perceived. Previous research in Singapore has shown that
27 the local population often possesses low perceptions of nurses [44], which may further
28 exacerbate the stigma they experience.
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36 It is also possible that this stigma experienced by psychiatrists and nurses operates in two
37 directions; the first being the stereotypic attitudes or perceptions projected out by them, whilst the
38 second is the associated attributes projected on them, which they may internalize [14].
39 Irrespective of the type of stigma, it is important that mental health professionals are aware of this
40 and how this may impact their role and work-related tasks. In order to address moderate and high
41 associative stigma associated with nurses and psychiatrists, these mental health professionals
42 need to explore and challenge such cases of stigma experienced by them. Associative stigma not
43 only devalues the individual but also the profession as a whole and therefore mental health
44 professionals play an important role in dispelling stigma related to mental illnesses [14].
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52 Associative stigma was found to be associated with job satisfaction. After adjusting for socio-
53 demographic correlates, we found that high associative stigma was associated with poorer job
54 satisfaction. Verhaeghe and Bracke [10] found associative stigma was associated with
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3 depersonalization and emotional exhaustion among mental health professionals in Belgium, with
4 the latter leading to decreased job satisfaction. The consequences of stigma in relation to job
5 satisfaction have been well documented. Similarly, associative stigma among mental health
6 professionals, can contribute to job stress and poorer outcomes not only in terms of staff well-
7 being but the quality of care provided to patients and therefore the implications can be detrimental
8 to both staff and their patients. Due to the cross-sectional nature of this study, the relation between
9 job satisfaction and associative stigma could be bi-directional and therefore exploring this
10 association over time would be beneficial. Interventions exploring how associative stigma
11 contributes to the development of emotional exhaustion, burnout and or job satisfaction and the
12 impact this has for patients, the quality of care they receive and the relationship they have with
13 mental health professionals are needed. Furthermore, developing programs with a particular
14 focus on associative stigma and coping strategies to deal with this among mental health
15 professionals would be beneficial [45].
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25 The findings of this study should be viewed in light of the following limitations. Firstly, at the time
26 the study was conducted, there was no developed and validated psychometric associative stigma
27 measure, and therefore items used to measure associative stigma were based on previous
28 research. Whilst such items have previously been used to measure associative stigma among
29 various health care professionals, the settings have varied and therefore a detailed pilot or expert
30 review in the local setting, would have been beneficial. There are now psychometric instruments
31 that do measure associative stigma such as the CASS, which have been validated in various
32 populations and are contributing to what was an under researched field. This was a cross-
33 sectional study among staff working at IMH and therefore these findings are not generalizable to
34 all mental health professionals in Singapore, nor could causal relationships be established.
35 However, given that this hospital is the primary provider of tertiary psychiatric care in Singapore,
36 and all staff included in the study are involved with the care of patients with a mental illness, it
37 provides valuable insight into the stigma associated with the mental health profession. The study
38 was limited to doctors, nurses and allied health staff and therefore associative stigma of other
39 staff including health care attendants, patient services associates and administrative staff was not
40 gathered and may differ. Whilst one of the primary aims was to explore differences in associative
41 stigma between occupations, we did not include doctors in the sample size calculation. At the
42 time of the survey, we knew that less than 100 doctors were working at IMH and therefore efforts
43 were made to recruit as many doctors as possible, given the small numbers in comparison to
44 numbers of nurses and allied health staff. Data were not collected on response rates, but rather
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3 once the desired quota of nurses and allied health staff was reached (i.e 200 of each group)
4 recruitment ceased, therefore it is difficult to ascertain the degree of selection bias. Furthermore,
5 data was not collected on those people that were invited to participate but chose not to respond
6 and therefore it is possible that responders and non-responders experiences of associative stigma
7 may differ. The invitation emails were sent to eligible staff through their institution email
8 addresses. Data collected were based on self-report and therefore respondents may have
9 provided socially desirable responses or may not have felt comfortable disclosing possible stigma
10 they may have experienced. Finally, it is important to acknowledge that stigma in general is a
11 complex and multi-faceted construct which has been theorised and defined in many ways and
12 can present in different forms such as personal stigma, perceived stigma, self-stigma, structural
13 stigma or associative stigma. This in itself poses various challenges as there may be some
14 overlap in these constructs and how they are measured.
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24 These limitations notwithstanding, this is one of just a few studies to explore associative stigma
25 among mental health professionals, and to our knowledge the only study to explore this within an
26 multi-ethnic Asian setting, and has thus added to the existing sparse literature. Using latent class
27 analysis, the current study has provided a greater understanding of the extent of associative
28 stigma among psychiatrists, nurses and allied health staff working at a psychiatric hospital. A 3-
29 class model of associative stigma was found to have the best fit, where classes were labeled as
30 no/low, moderate and high associative stigma. Based on these classes, it would be beneficial to
31 further explore this construct via longitudinal studies or repeatedly measuring associative stigma
32 over time to compare outcomes such as quality of life and burnout, as well as different types of
33 job satisfaction across the different classes in order to determine effective interventions to reduce
34 associative stigma among mental health professionals. At the same time, there is also a scarcity
35 of literature relating to the development and evaluation of interventions to combat stigma
36 experienced by health professionals [23]. Research has however shown that increment or
37 improvement in knowledge as well as actual contact with people who have a mental illness can
38 help to reduce stigma, whilst improving the image of psychiatry and psychiatrists [24] and
39 therefore future interventions addressing associative stigma should incorporate such strategies.
40 Furthermore, in order to reduce stigma, interventions should also include information and
41 education related to the stereotypes (e.g dangerousness) healthcare providers may experience,
42 which can further exacerbate associative stigma.
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55 There is a need to further explore the outcomes of associative stigma, not just from the
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3 perspective of those experiencing this stigma (in this case mental health professionals) but the
4 impact this stigma may have on their patients and potentially the wider community. Given that
5 high associative stigma was associated with poorer job satisfaction, which has been shown to
6 have poorer outcomes for patients [10], the implications of this finding are not only important to
7 the well-being of staff but also patients. As stigma towards people with a mental illness,
8 psychiatrists, and the mental health profession is highly interrelated, the ongoing process and
9 difficult task of combating stigma related to mental illnesses continues. Associative stigma has
10 received comparatively little attention from empirical researchers and continued efforts to address
11 this under-studied yet important construct in conjunction with future efforts to dispel many of these
12 misconceptions are needed.
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20 **Word Count:** 5848
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22 **DECLARATIONS**

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25 **Ethics approval:** Ethical approval was obtained from the Domain Specific Review Board of the
26 National Healthcare Group, Singapore prior to the launch of the survey.
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28 **Patient consent:** Obtained
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31 Health's National Medical Research Council under the Centre Grant Programme (Grant No.:
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33

34 **Competing interest:** The authors declare they have no competing interests
35

36 **Author contributions:** LP developed the study design, collected and verified the data and wrote
37 the manuscript. SC assisted with the data collection and verification and provided intellectual
38 inputs to the manuscript. EA and QY analyzed and interpreted the data and provided intellectual
39 inputs to the manuscript. BYC assisted with the set-up and monitored the online survey and
40 provided intellectual inputs to the manuscript. JAV provided intellectual inputs into the study
41 design and interpretation of the findings. SO and KLY provided intellectual inputs into the study
42 design and provided inputs to the manuscript. HCC provided clinical inputs into the findings and
43 edited the manuscript. SAC and MS assisted in study design, interpreted the data, and provided
44 intellectual inputs on the manuscript. All authors read and approved the final manuscript.
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50 **Availability of data and materials:** Data is not available for online access, however readers who
51 wish to gain access to the data can write to the senior author Dr Mythily Subramaniam at
52 mythily@imh.com.sg with their requests. Access can be granted subject to the Institutional
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5

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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 entropy 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 3)		
			CLASS 1 No/low 48.7% (n=225)	CLASS 2 Moderate Prevalence 40.5% (n=187)	CLASS 3 High 10.8% (n=50)
			Item response probabilities*		
1	People react negatively when they know I work in a mental health care setting	60.61	0.46	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

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*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.

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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 indicate 10 and 11 years of education, respectively.

^b= 'A' level indicates 12 years of education.

Table 5: Relationship between associative stigma and job satisfaction

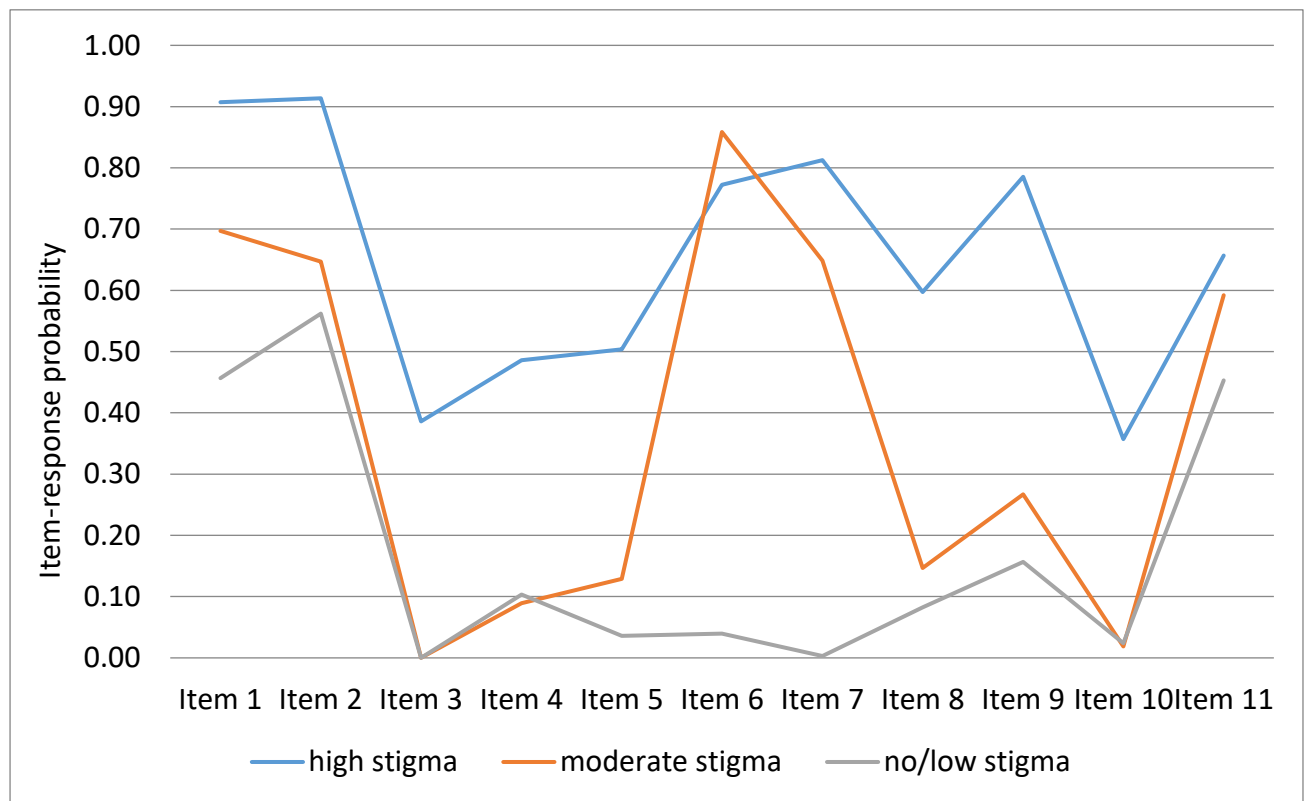
Latent classes	Job satisfaction			Beta coefficient	Model 1		p value	Adjusted Beta coefficient	Model 2		p value
	n	Mean	SD		95% CI				95% CI		
					Lower	Upper			Lower	Upper	
No/low associative stigma	225	7.24	1.52	Ref.				Ref.			
Moderate associative stigma	187	7.26	1.51	0.02	-0.28	0.32	0.9132	-0.18	-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

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For peer review only

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



review only

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 (b) Give reasons for non-participation at each stage (c) Consider use of a flow diagram	7-8
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders (b) Indicate number of participants with missing data for each variable of interest	7-8
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 (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	8-9
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.