

Socio-demographic Correlates of Positive Mental Health and Differences by Depression and Anxiety in an Asian Community Sample

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Abstract

Introduction: Positive Mental Health (PMH) instrument is a self-administered multi-dimensional measure that is validated in the adult multi-ethnic Asian population in Singapore and comprises General Coping (GC), Emotional Support (ES), Spirituality, Interpersonal Skills (IS), Personal Growth and Autonomy (PGA) and Global Affect (GA) domains. This paper aimed to (i) examine socio-demographic differences and identify correlates for the total PMH and domain-specific scores in the sample, and (ii) compare the PMH total score for respondents with and without depression or anxiety. **Materials and Methods:** Singapore residents aged 21 to 65 years, of Chinese, Malay or Indian ethnicity and residing in households across Singapore (n = 404) completed the 47-item PMH instrument in an anonymous survey. Socio-demographic information was obtained during the survey and respondents also completed the Patient Health Questionnaire (PHQ)-8 and Generalised Anxiety Disorder (GAD)-7 scale to establish depression and anxiety. Descriptive analyses were conducted to examine for differences in PMH scores by socio-demographic groups and between those with and without depression and anxiety. **Results:** The total PMH score was significantly different across ethnicity and marital status in the bivariate analysis. After multivariate analysis, ethnicity remained a significant correlate for total PMH and the 6 domain-specific PMH scores, marital status correlated with Spirituality, educational level was associated with IS; while gender was associated with ES and PGA. Significantly lower PMH total scores were observed for those with depression and anxiety as compared to those without. **Conclusion:** Socio-demographic correlates of PMH were identified in an Asian community sample. PMH scores were significantly lower among those with depression and anxiety.

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Key words: Ethnicity, Marital status, Positive mental health, Spirituality

Introduction

In the past, the study of mental health status and indicators was restricted to the medical perspective of understanding and establishing the prevalence and risk factors of mental illness in the population.¹⁻³ In 1996, Keith Tudor defined mental health as a positive concept and separated it from mental illness and psychopathology.⁴ He hypothesised that an individual with mental illness who is able to cope with it and function adequately, possesses an acceptable level of mental health. A combination of the components of subjective and psychological well-being were then used to define and assess the state of mental health of an individual.^{5,6} In 2001, the World Health Organization declared that mental health is more than just the absence of mental illness and put forth the definition of mental

health from an individual and societal perspective.^{7,8} Policy makers have since focused on mental health interventions and outcomes to alleviate health problems and gauge the overall well-being in a population. Concerted efforts to derive a well-being or happiness index that reflects the relevant and culturally appropriate structure of mental health of the population are underway in various countries.⁹⁻¹¹ It is also an area of interest and importance in public health, economic policy and research in Singapore.¹² In Singapore, there is a growing awareness of the importance of mental health among the policy makers and the first National Mental Health Policy and Blueprint (NMHBP) which was launched in 2007 strongly emphasised the importance of promoting mental well-being and building resilience in the Singapore population.

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Various studies have reported the influence of socio-demographic variables on the different dimensions of PMH. Subgroup specific variations were reported in the 2006 National Scottish survey of public attitudes to mental well-being and mental health problems¹³ where the Warwick-Edinburgh Mental Well-being Scale (WEMWBS) was used to measure well-being by assessing positive affect, functioning and satisfying interpersonal relationships of an individual. The sample comprised largely of Caucasians and only 1.7% represented Asian communities.¹³ It therefore remains unresolved if there would be variations in the PMH scores by demographic variables and their predictive capacity in an entirely Asian multi-ethnic adult population.

As part of the Singapore Mental Health Study (SMHS), an instrument to measure the level of PMH in the multi-ethnic adult community-based population in Singapore was developed and validated using an exploratory mixed methods design.^{14,15} The instrument has a multi-dimensional structure consisting of 6 domains that cover the psychological and subjective aspects of well-being. The instrument is designed to allow comparisons across age, gender and ethnic groups.

While validating the PMH instrument, moderate negative correlations with the Patient Health Questionnaire (PHQ)-8 and Generalised Anxiety Disorder (GAD)-7 scale¹⁴ were observed, prompting an interest to explore the differences, if any, in PMH scores among those with depression and anxiety versus those who do not have these disorders.

In this study, we examined the socio-demographic differences and identify correlates for the total PMH and domain-specific scores in the sample. Secondly, this study explored differences in the PMH total score among people with or without depression and anxiety as assessed by the PHQ-8 and GAD-7, respectively.

Materials and Methods

Ethics

Prior to the data collection, ethical approval and waiver of written consent were obtained from the Institutional Review Board. An information sheet attached to the questionnaire provided details on the purpose, procedures and requirements of the study to the respondents. The survey was anonymous; i.e. data were not linked to any identifiers such as name, address, etc, and the return of completed questionnaires was considered as an implied consent.

Survey

The detailed survey methodology is described elsewhere.¹⁴ Briefly, 404 adult Singapore Residents (Citizens and Permanent Residents), belonging to Chinese, Malay or Indian ethnicity (the 3 major ethnic groups in Singapore),

aged 21 to 65 years and literate in English were included in the study. A quota sample was used to ensure adequate representation by age, gender and ethnicity. Respondents were recruited randomly through household level purposive sampling, whereby household residents were approached and the study was explained and if interested, one member of the household was selected based on the required quota. It was ensured that households were distributed uniformly across geographic districts in Singapore to obtain a representative spread by area. For the difficult-to-encounter cases (such as older Permanent Residents or English literate older residents) street intercepts were used. Research Assistants were stationed at public areas such as malls, and community centres where they approached pedestrians regarding the study and then followed the same procedures as at the household.

Questionnaire

The survey questionnaire was self-administered and consisted of 3 sections. In the first section, information on respondents' socio-demographic characteristics was collected. This included information on age, gender, ethnicity, marital status, education and employment.

This was followed by the 47-item PMH instrument that has the following 6 domains:

(i) General Coping (GC): This refers to one's reaction and coping strategies during stressful situations, the ability to think positively and engage in choice activities.

(ii) Emotional Support (ES): ES is important to help one cope with difficult life situations and gives one the assurance of feeling loved and wanted. Willingness to share burdens and fears with others are important for compassionate, realistic advice and care.

(iii) Spirituality: This domain covers both spiritual and religious practices and beliefs that influence one's faith and behaviour in life. It contributes to PMH as a coping mechanism and a means to building strong social support and networks.

(iv) Interpersonal Skills (IS): IS are associated with all aspects of mental health and are crucial in helping one develop and maintain good relationships, which in turn provide the support and network needed during times of distress.

(v) Personal Growth and Autonomy (PGA): Knowing one's goals in life and ways to achieve them is a sign of good mental health. It reflects on one's level of confidence,

freedom, sense of purpose, and the ability to self-evaluate and make decisions.

(vi) *Global Affect (GA)*: The experience of positive mood is a sign of mental health. Being calm, happy and enthusiastic are indicative of emotional stability and vitality.

For the first 5 domains, respondents were asked to select a number showing how much the item described them on the scale of 1 to 6, where '1' represented 'not at all like me' and '6' corresponded to 'exactly like me'. The GA subscale included a list of 5 affect indicators and required respondents to indicate 'how often over the past 4 weeks they felt—calm, peaceful, etc using a 5-point response scale (where '1' indicates 'never or very rarely' and '5' represented 'very often or always'.

The third section of the questionnaire presented 14 validity measures that were used to establish the criterion validity of the PMH instrument. These included assorted scales or items addressing general health, mental health, life satisfaction, social support, resilience, etc. The validity scales/items were divided into 2 separate versions of the survey questionnaires to avoid administrative burden. Among the divergent measures, PHQ-8,¹⁶ and GAD-7 Scale¹⁷ were included. The PHQ-8 is a depression scale that adopts a 4-point scale, where 0 = not at all and 3 = nearly everyday. Respondents indicate how often they have been bothered by each of the items in the past 2 weeks. Total scores range from 0 to 27, where scores of 20 and above indicate severe major depressive disorder. The GAD-7 Scale is a 7-item anxiety measure, where respondents are asked whether they have been bothered by a series of problems in the past 2 weeks and if so, how often, using a 4-point scale from 'not at all' to 'nearly every day'. Scores are summed and higher score indicate greater anxiety.

The questionnaire was completed by respondents at their own convenience and then placed in a sealable envelope that was provided to maintain confidentiality and avoid social desirability bias. The questionnaires were collected by interviewers within 3 days of distribution. Quality control measures and good practices included training of interviewers, pre-testing of processes and materials, field monitoring of data collection, and key punch verification using 100% double data entry checks.

Statistical Analyses

Data management and statistical analyses were performed with PASW statistics 18.0 (SPSS, Chicago, IL). Descriptive data were tabulated for socio-demographic groups and dependent measures, and were presented as means \pm SD.

Independent t-tests and ANOVA with Bonferroni post-hoc tests were performed to establish the differences for total PMH and domain specific scores by socio-demographic subgroups. Linear regression analysis was used to explore the predictive power of socio-demographic variables in relation to the PMH total and domain-specific scores as dependent variables. Statistical significance was considered at $P < 0.05$ and all tests were 2-sided. To address the second objective of the study, we first tested the internal consistency of the measure (using Cronbach's alpha coefficient) and then investigated the relationships between the PMH scale and PHQ-8 and GAD-7 with Pearson's correlation coefficient using the mean score of all scales. Cut-off scores of more than 10 as reported from studies conducted elsewhere were used to identify people with depression and anxiety.^{16,17} We investigated the differences in the PMH scores by using non-parametric tests and presented the mean and median scores for each group.

Results

The study included a sample of 404 respondents aged 21 to 65 years with a mean age (SD) of 41.1 (12) years, with a similar number of respondents aged 21 to 39 years, and 40 years and above. The sample had 49% men and 51% women (Table 1). Among the respondents, 25.4% were single, 71% were married and about 3% were separated/divorced or widowed. The majority (38.8%) were Secondary/ Junior

Table 1. Socio-demographic Characteristics of the Sample

		Mean	SD
Age (years)		41.1	12.0
		Frequency	%
Age group	21 – 39 years	184	50.3
	40 years and above	182	49.7
Gender	Men	197	49.0
	Women	205	51.0
Ethnicity	Chinese	134	33.3
	Malay	123	30.6
	Indian	141	35.1
Marital status	Single	102	25.4
	Married	288	71.6
	Separated/ Divorced/ Widowed	12	3.0
Highest education attained	Some formal /primary education	33	8.3
	Secondary/ Junior College/ Pre University	155	38.8
	Vocational	95	23.8
	Tertiary	116	29.1
Current employment status	Unemployed	138	34.2
	Employed	266	65.8

College/ Pre University educated, followed by those with tertiary education (29.1%). The rest had either Vocational education or primary level education.

Socio-demographic Differences in PMH Total and Domain-specific Scores

The mean (SD) of the total PMH and domain-specific scores for the complete sample and by socio-demographic groups are shown in Table 2. There were significant differences in total PMH domains across the socio-demographic variables. The Spirituality domain score was significantly higher among those aged 40 years and above ($P = 0.038$). Gender differences existed for the ES and PGA domains, with women having a significantly higher score for ES ($P = 0.037$) and lower score for PGA ($P = 0.015$) as compared to men. Except for the GA domain, there were significant differences for total and all other domain scores across ethnicity. After adjusting with Bonferroni's post hoc tests, respondents belonging to Malay or Indian ethnicity had significantly higher scores ($P < 0.05$) for total PMH and the 5 domains as compared to the Chinese respondents (excluding GC, where Chinese and Indians did not vary). In addition, Malay respondents had higher Spirituality scores as compared to Indians ($P = 0.031$) (Table 2).

Socio-demographic Correlates of PMH Total and Domain-specific Scores

After including the socio-demographic variables as predictors in the multiple linear regression analyses, ethnicity remained a significant predictor for the total PMH and the 6 domain specific scores. In addition, gender was associated with ES and PGA, marital status correlated with Spirituality score and educational status was significantly associated with IS (Table 3).

Comparison of PMH Total Score Among Respondents with and Without Depression and Anxiety

The internal consistency of PHQ-8 and GAD-7 in the sample was high with Cronbach alpha values being 0.84 and 0.90, respectively. There was moderate negative correlation between PMH and PHQ-8 and GAD-7 scores (Table 4). The median PMH total score among those with anxiety was significantly lower than among those without anxiety (4.09 and 4.69 respectively; $P = 0.025$). Similarly, the median PMH total score among those with depression was significantly lower than among those without depression (4.37 and 4.91 respectively; $P = 0.000003$) (Fig. 1).

Discussion

The present study examined the socio-demographic differences in the PMH scores among the multi-ethnic adult population in Singapore. We also identified correlates for the total PMH and domain-specific scores in the sample and compared the PMH total score for respondents with and without depression or anxiety with the intent of exploring the relationship between PMH and psychological distress.

Socio-demographic Differences and Correlates of PMH

(i) Effect of Age: The study supports the belief that older individuals have higher spirituality, a finding that is consistent with other studies.^{18,19} A number of possible explanations have been proposed. Tronstam¹⁹ found that people move away from a materialistic view of the world towards a broader and less materialistic one with age. It is also believed that higher stages of faith are characterised by sense of unity, transcendence and wisdom that can be achieved with age.^{20,21} On the other hand, others²² relate the higher spirituality among older individuals with the physical strains experienced with age and propose its role as a coping mechanism. However, the effect of age did not remain significant after controlling for other socio-demographic factors; instead, marital status and ethnicity emerged as predictors for Spirituality.

(ii) Effect of Gender: There were significant gender differences for ES and PGA domains. Gender remained a significant predictor for ES, with women having a higher ES and lower PGA. Several studies have shown similar gender differences in perception of health and well-being.²³ Gross and John²³ hypothesised that men and women differ in their strategies to regulate emotions and these are mediated by 'reappraisal' and 'suppression' which influence their affect, well-being and social relationships. Reappraisal is used to down-regulate negative emotions and hence reduce the behavioral components. On the contrary, while suppression could contain the expression of negative emotion, it might also lead to curtailing the expression of positive emotion. This effect of suppression could accumulate over time and lead to disconnect between 'inner experience and outer expression'²⁴ and isolate the individual from themselves and others.²⁵ These studies showed significantly higher suppression among men than women; suppression was also negatively correlated with various domains of well-being such as life satisfaction, self-esteem and components of psychological well-being. We, however, observed this difference only in the ES and PGA domains. Further research is needed to investigate the influence of culture or other factors such as role performance to understand the effect of gender on PMH domains.

Table 2. PMH Total and Domain Scores Across Socio-demographic Characteristics

	Total PMH Score		General coping		Emotional support		Spirituality		Personal growth and autonomy		Interpersonal skills		Global affect	
	Mean ± SD	P	Mean ± SD	P	Mean ± SD	P	Mean ± SD	P	Mean ± SD	P	Mean ± SD	P	Mean ± SD	P
Overall Sample	4.53 ± 0.74		4.34 ± 0.96		4.80 ± 1.00		4.29 ± 1.49		4.64 ± 0.88		4.69 ± 0.84		4.37 ± 0.98	
Age Group														
21 – 39 years	4.48 ± 0.70	0.042	4.34 ± 0.85	0.800	4.90 ± 0.91	0.144	4.09 ± 1.55	0.038	4.57 ± 0.85	0.213	4.70 ± 0.73	0.992	4.32 ± 0.95	0.262
40 years and above	4.58 ± 0.76		4.37 ± 1.03		4.75 ± 1.02		4.42 ± 1.43		4.69 ± 0.92		4.70 ± 0.93		4.44 ± 0.94	
Gender														
Men	4.51 ± 0.78	0.591	4.39 ± 0.93	0.376	4.70 ± 0.99	0.037	4.20 ± 1.56	0.234	4.75 ± 0.87	0.015	4.73 ± 0.82	0.318	4.32 ± 0.94	0.338
Women	4.55 ± 0.70		4.30 ± 0.98		4.91 ± 1.00		4.38 ± 1.41		4.53 ± 0.88		4.65 ± 0.85		4.41 ± 1.02	
Ethnicity														
Chinese	4.19 ± 0.74	<0.001 ^{ac}	4.18 ± 0.95	0.001 ^{ac}	4.59 ± 1.03	0.009 ^{ab}	3.32 ± 1.63	<0.001 ^{abc}	4.38 ± 0.95	<0.001 ^{ac}	4.43 ± 0.87	<0.001 ^a	4.21 ± 0.95	0.062
Malay	4.78 ± 0.60		4.60 ± 0.87		4.93 ± 0.87		5.00 ± 0.90		4.80 ± 0.72		4.86 ± 0.73		4.49 ± 0.89	
Indian	4.63 ± 0.74		4.27 ± 1.00		4.89 ± 1.04		4.58 ± 1.26		4.74 ± 0.90		4.79 ± 0.84		4.42 ± 1.06	
Marital Status														
Single	4.36 ± 0.77	0.022 ^d	4.22 ± 0.92	0.025	4.71 ± 1.06	0.514	3.75 ± 1.67	<0.001 ^d	4.49 ± 1.00	0.121	4.59 ± 0.90	0.383	4.22 ± 0.99	0.101
Married	4.60 ± 0.72		4.41 ± 0.94		4.84 ± 0.97		4.47 ± 1.37		4.70 ± 0.83		4.73 ± 0.80		4.44 ± 0.97	
Separated/ Divorced/ Widowed	4.42 ± 0.84		3.74 ± 1.49		4.88 ± 1.08		4.42 ± 1.40		4.50 ± 0.87		4.74 ± 1.20		4.08 ± 0.96	
Highest Education Attained														
Some formal / Primary education	4.60 ± 0.92	0.245	4.19 ± 1.14	0.337	4.65 ± 1.21	0.263	4.42 ± 1.38	0.013 ^e	4.54 ± 1.17	0.549	4.44 ± 1.33	0.193	4.31 ± 1.27	0.275
Secondary/ Pre U/ Junior College	4.61 ± 0.75		4.45 ± 1.09		4.77 ± 1.03		4.55 ± 1.35		4.71 ± 0.86		4.77 ± 0.87		4.39 ± 0.96	
Vocational	4.42 ± 0.80		4.27 ± 0.92		4.72 ± 1.06		4.19 ± 1.51		4.56 ± 0.98		4.62 ± 0.79		4.21 ± 0.96	
Tertiary	4.49 ± 0.62		4.30 ± 0.74		4.95 ± 0.85		3.96 ± 1.62		4.62 ± 0.71		4.70 ± 0.63		4.47 ± 0.95	
Current Employment Status														
Unemployed	4.44 ± 0.83	0.086	4.26 ± 0.99	0.251	4.73 ± 1.09	0.308	4.21 ± 1.49	0.420	4.49 ± 0.92	0.021	4.56 ± 0.95	0.029	4.29 ± 1.10	0.240
Employed	4.58 ± 0.69		4.38 ± 0.94		4.84 ± 0.95		4.34 ± 1.48		4.71 ± 0.85		4.76 ± 0.77		4.41 ± 0.91	

Significant difference was set at $P < 0.05$ derived from independent t-test and one way ANOVA test. Bonferroni post hoc test: ^aSignificant difference between Chinese vs Malay; ^bSignificant difference between Chinese vs Indian; ^cSignificant difference between Malay vs Indian; ^dSignificant difference between Single vs Married; ^eSignificant difference between Secondary/ Pre U/Junior College vs Tertiary.

Table 3. Socio-demographic Correlates of PMH Total and Domain Scores

	Total PMH Score			General coping			Emotional support			Spirituality			Personal growth and autonomy			Interpersonal skills			Global affect		
	β	95% CI	β	95% CI	β	95% CI	β	95% CI	β	95% CI	β	95% CI	β	95% CI	β	95% CI	β	95% CI	β	95% CI	
Age 40 and above vs 21 to 39 years	0.04	(-0.14, 0.22)	-0.02	(-0.25, 0.21)	-0.15	(-0.38, 0.09)	0.20	(-0.12, 0.53)	0.08	(-0.13, 0.3)	-0.02	(-0.22, 0.18)	0.11	(-0.13, 0.34)							
Women vs Men	0.07	(-0.09, 0.23)	-0.07	(-0.28, 0.14)	0.24	(0.03, 0.45)*	0.23	(-0.07, 0.52)	-0.2	(-0.4, -0.01)*	-0.05	(-0.23, 0.13)	0.12	(-0.10, 0.33)							
Malay vs Chinese	0.59	(0.4, 0.79)†	0.43	(0.19, 0.68)†	0.39	(0.14, 0.64)†	1.64	(1.29, 1.99)†	0.45	(0.22, 0.68)†	0.42	(0.21, 0.64)†	0.24	(-0.01, 0.50)							
Indian vs Chinese	0.46	(0.27, 0.64)†	0.13	(-0.11, 0.36)	0.38	(0.14, 0.63)†	1.18	(0.85, 1.52)†	0.41	(0.18, 0.63)†	0.43	(0.23, 0.64)†	0.29	(0.04, 0.53)*							
Married vs Single/ Separated/	0.16	(-0.04, 0.35)	0.18	(-0.07, 0.42)	0.16	(-0.09, 0.41)	0.45	(0.10, 0.80)*	0.15	(-0.08, 0.38)	0.08	(-0.13, 0.30)	0.09	(-0.16, 0.35)							
Divorced/Widowed vs Single	-0.04	(-0.51, 0.44)	-0.39	(-1.02, 0.23)	0.09	(-0.53, 0.71)	0.08	(-0.77, 0.93)	0.06	(-0.5, 0.63)	0.2	(-0.33, 0.73)	-0.15	(-0.78, 0.47)							
Secondary/ Pre U/ Junior College vs Some formal / Primary Education	0.07	(-0.23, 0.38)	0.21	(-0.17, 0.58)	0.22	(-0.16, 0.61)	0.30	(-0.24, 0.83)	0.21	(-0.14, 0.57)	0.39	(0.06, 0.72)*	0.17	(-0.22, 0.56)							
Vocational vs Some formal / Primary Education	-0.10	(-0.43, 0.24)	0.02	(-0.39, 0.44)	0.09	(-0.35, 0.52)	0.11	(-0.48, 0.70)	0.05	(-0.35, 0.45)	0.18	(-0.10, 0.54)	0.01	(-0.42, 0.44)							
Tertiary vs Some formal / Primary education	-0.01	(-0.35, 0.32)	0.11	(-0.31, 0.52)	0.28	(-0.15, 0.71)	0.01	(-0.58, 0.59)	0.15	(-0.25, 0.55)	0.25	(-0.11, 0.62)	0.17	(-0.26, 0.60)							
Employed vs Unemployed	0.12	(-0.06, 0.29)	-0.01	(-0.23, 0.21)	0.1	(-0.13, 0.33)	0.11	(-0.20, 0.43)	0.11	(-0.09, 0.32)	0.11	(-0.08, 0.31)	0.12	(-0.11, 0.35)							
R square	12.9%		3.6%		4.4%		25.5%		6.4%		6.2%		0.1%								

Unstandardised beta coefficient was derived from multiple linear regressions.

* $P < 0.05$, † $P < 0.01$

Table 4. Correlation of PMH Domains with PHQ-8 and GAD-7

	Mean	SD	Positive Mental Health	General coping	Emotional support	Spirituality	Personal growth & autonomy	Interpersonal skills	Global affect
PHQ-8	11.8	3.9	-0.46‡	-0.35‡	-0.30‡	-0.20†	-0.36‡	-0.28‡	-0.61‡
GAD-7	5.1	4.4	-0.29†	-0.14*	-0.12	-0.12	-0.29‡	-0.08	-0.50‡

Spearman's Correlation * $P < 0.05$; † $P < 0.01$; ‡ $P < 0.001$

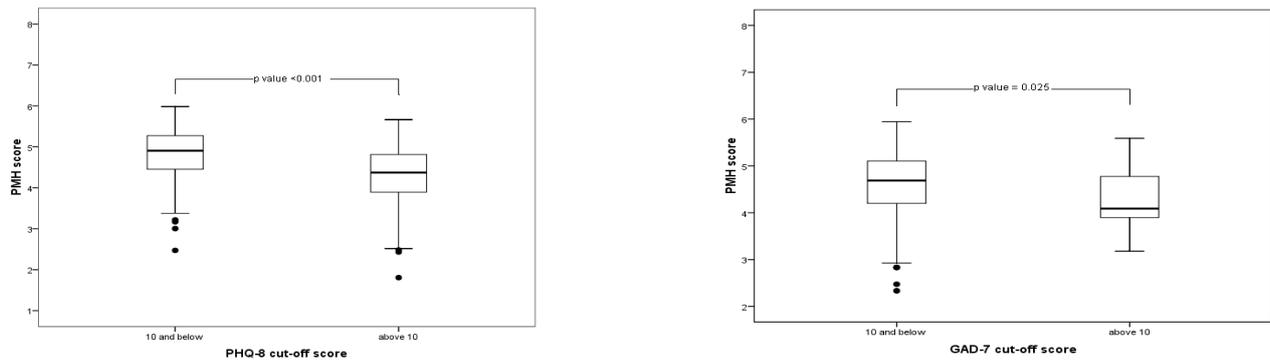


Fig. 1. Comparison of PMH scores between the 2 groups.

(iii) *Effect of Ethnicity*: There is a growing interest in the extent to which culture and ethnicity influence mental health. In our study, significant ethnic differences were observed in the PMH domains, with consistently lower scores across several domains for the Chinese respondents. Ethnic differences in mental health are well-reported for both negative and positive domains.^{26,27} Differences in the level of well-being of Western and Asian populations have also been reported.^{28,29} Studies conducted among Asian Americans have shown that even within ethnicity, the language, age, gender, and other cultural beliefs influence mental health and expression of experiences.³⁰ Expression and verbalisation of emotions by collectivist cultures such as the Chinese, Japanese, Korean and Vietnamese have been attributed to the Confucian principles that ‘discourage open displays of emotions in order to maintain social and familial harmony’.³⁰ These have been associated with under-reporting as well as linked to somatisation of psychological distress, where a person prefers to express distress through the body rather than mind.^{31,32} Of interest would be to explore a possible equivalent of ‘somatisation’ for PMH and see if those with higher levels of PMH tend to report better physical health (yet having a physical disorder/disability). To the best of our knowledge, there are no studies that have compared levels of psychological well-being or PMH among different Asian ethnicities.

(iv) *Effect of Marital Status, Education and Employment*: The variations in PMH by marital status, education and

employment provided interesting leads to future hypotheses testing. Married respondents had significantly higher levels of total PMH as compared to those who were single.

Contrary to some theories,^{33,34} education level did not influence total PMH and domains (except for IS and Spirituality) at bivariate and multivariate level. Respondents with tertiary education had lower Spirituality scores as compared to those with Secondary/ Junior College/ Pre-University education in our sample. There is some evidence for higher spirituality among individuals with lower education and lower income.³⁵ It has been proposed that spirituality might increase with adverse life situations that require higher coping strategies and greater need for faith and resilience.³⁵ It is possible that people with higher education might find meaning in the knowledge gained through education and this reduces their acceptance of faith and spiritual relativism.³⁶ However we were unable to investigate these in our study. There are conflicting reports about the influence of higher education on a person’s well-being. It is believed that education improves psychological and subjective well-being³³ by improving learning, self-esteem and socio-economical conditions of a person,^{34,37} yet many studies have consistently reported lower levels of satisfaction and well-being among those with higher education.^{38,39} The reasons elicited include greater inclination towards material means, complex work tasks and other pressures.^{38,40}

As expected and reported in existing literature, employed respondents had higher IS and PGA. While it is possible

that growth-oriented people with better interpersonal skills have higher chances of being employed, loss of skills due to unemployment cannot be ruled out.⁴¹ However, due to the cross-sectional nature of the study, we are unable to comment of the cause and effect relationship between these domains and employment status.

Another notable finding is that among all the PMH domains, the GA domain was not influenced by any socio-demographic variables. Unlike the rest of the items, for the GA domain, respondents were asked to recall their affects over a period of 4 weeks using a 5-point frequency response scale. Studies on recent life-span theories of emotion and socio-demographic variations in positive affect have shown a curvilinear relationship with age and have indicated that information on personality and context is needed to fully understand the effects on positive affect;⁴² however, such data were not collected during the survey.

Differences in PMH Among Respondents with and Without Depression and Anxiety

We found significant differences in PMH total scores among those with depression and anxiety as compared to those who did not have these problems. This being a cross-sectional study, we are unable to determine if those with low PMH total scores develop depression or anxiety over a period of time or whether depression and anxiety with the associated signs and symptoms affect the multiple domains of PMH, such as those of PGA, IS and GA, to an extent that PMH suffers in such individuals given the chronic nature of these illnesses. A cohort study by Keyes et al⁴³ that examined mental health and mental illness at 2 separate time points, found that gains in mental health decreased the odds, and losses of mental health increased the odds of the incidence of mental illness. They postulated that mental health is dynamic at an individual level and that promotion and protection of mental health can reduce mental illness in the population. This was an exploratory study that measured the levels of the multiple positive mental health dimensions among people with depression and anxiety. Given the fact that the PMH instrument is based on aspects of psychological well-being, lower PMH scores were not surprising among those with some psychological distress. However, the correlation of the PHQ-8 and GAD-7 scales with the PMH dimensions varied widely (Pearson's correlation coefficient ranged from -0.20 to -0.61 and -0.08 to 0.50, respectively) and was only moderately strong for the total PMH, which suggests that although there seems to be an overlap in the depression/ anxiety state and level of PMH of an individual, this association is complex and possibly dependent on other factors. Further research is needed to establish this relationship to guide clinical practice.

Limitations

These findings relate to cross-sectional observations in a comparatively smaller community sample that cannot be generalised to the overall population or used to establish causal relationships. Only English speaking adults who were between 21 and 65 years of age were included in the survey. The validity of the measure for use among the non-English speaking and younger and older populations needs to be assessed. Additional measures such as including a scale on religiosity may provide further information on the domain scores. We did not collect information on income, a variable that has been shown to significantly influence mental health.³⁵ However, we believe that inclusion of education and employment status could have possibly served as a proxy for income and accounted for its effect in the analyses. As the validity measures were divided in 2 separate questionnaires, the PHQ-8 and GAD-7 were administered to independent groups of respondents. A combined binary variable with scores of the 2 measures may have provided further evidence of the properties of the PMH instrument. The survey included a convenient sample of residents across Singapore. However, we were unable to obtain adequate information to conduct response rate calculations and attrition analysis for the survey as many residents were unwilling to provide the necessary demographic information and reason(s) for refusal. Further testing in a larger and representative population is necessary to improve the generalisability of the findings.

Conclusion

This is the first study to measure the independent components of PMH across different socio-demographic groups in an entirely Asian population using a multi-dimensional instrument. To date, there are very few multi-dimensional measures for assessing the level of PMH, and fewer have combined psychological and subjective well-being theories in the measurement of mental health limiting direct comparison and recommendations from the findings. Variations in the PMH domains scores highlight the need for customising mental health policies and strategies on the basis of socio-demographic characteristics of the population to achieve maximum effectiveness of the interventions. There is also an increasing need for embedding mental health promotion and/or interventions within well planned research protocols that can examine the effect of improving mental health within a community. Seligman⁴⁴ stated that “bringing about well-being—positive emotion, engagement, purpose, positive relationships, positive accomplishment—may be one of our best weapons against mental disorder” again pointing towards the protective role of positive mental health against the development of mental illnesses. Positive mental health promotion marks a paradigm shift

from a deficits-based model of intervention and treatment of mental illnesses to a positive, strength-based model of health promotion.

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