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Causal Beliefs of Mental Illness and its Impact on Help-seeking Attitudes: A cross-sectional study among university students in Singapore

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Title: Causal Beliefs of Mental Illness and its Impact on Help-seeking Attitudes: A cross-sectional study among university students in Singapore

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Abstract

Objectives: Among individuals in Singapore who suffer from mental illness in their lifetime, a considerable proportion of them have not sought any form of professional help. The reluctance to seek professional help could be due to misconceptions on the causes of mental illnesses. Research has shown that help-seeking attitudes can predict actual service use. As young adults are most at risk of developing mental illness, this study aims to elucidate the impact of causal beliefs about mental illness on help-seeking attitudes amongst university students in Singapore.

Design: Prior to attending an anti-stigma intervention, participants' data were collected via cross-sectional self-administered questionnaires which included the Causal Beliefs about Mental Illness scale, the Inventory of Attitudes towards Seeking Mental Health services, and questions pertaining to participants' sociodemographic background. Multiple linear regressions were performed to examine the relationship between causal beliefs and help-seeking, as well as their sociodemographic correlates.

Participants: 390 students who were studying at a Singapore's university at time of recruitment.

Results: Younger age was associated with higher scores on psychosocial attribution, while prior social contact with individuals with mental illness was significantly associated with lower scores on personality attribution. With regard to help-seeking attitudes; being a male and personality attribution were significantly associated with lower scores on 'Psychological Openness' and 'Indifference to Stigma', while psychosocial attribution was significantly associated with higher scores on 'Help-seeking Propensity'. Having prior social contact also predicted higher 'Psychological Openness', while being in Year 2 and 3 predicted lower scores on "Indifference to Stigma".

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Conclusion: Findings from this study suggest that help-seeking attitudes might be influenced by causal beliefs, with personality attribution being the most impairing. Hence, to reduce the wide treatment gap in Singapore, anti-stigma interventions targeting young people could focus on addressing beliefs that attribute mental illness to the personality of the individual.

Strengths and Limitations

- A vignette-based approach was adopted to assess causal attributions relating to depression, allows comparison to other studies which also employs vignette-based approach.

- This is the first study to examine the relationship between causal beliefs of mental illness and help-seeking attitudes in a sample of university students in Singapore.

- This study highlights potential misconceptions young adults in higher education setting have about the causes of mental illnesses which should be addressed in mental health literacy programs.

- As the study is voluntary, there may be self-selection bias, as attitudes and knowledge of non-responders may differ from participants, which may not be possible to capture from this study.

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INTRODUCTION

Mental illness poses a greater global economic burden than chronic somatic diseases, with an estimated economic cost of US$2.5 trillion worldwide, and this is expected to double by 2030. Despite the high prevalence of mental disorders and the considerable disease burden caused by it, many individuals with mental illness remain untreated resulting in a treatment gap that is wider than that in any other health sector [1]. Furthermore, untreated mental disorders could result in severe ramifications for the individual. For instance, a person suffering from a single disorder –if not treated in time- may go on to develop more serious symptoms and other complex comorbid disorders that complicate the treatment required [2][3].

Given the implications of the wide treatment gap for mental disorders, it is important to understand the factors that influence an individual's help-seeking attitudes. For example, attitudes towards help-seeking have been reported to influence actual service use [4]. Often, the underutilization of mental health services can be due to stigma [5][6]. An individual may avoid seeking treatment due to their aversion towards being labelled with a mental illness (label avoidance) and its negative consequences, such as becoming ostracized or discriminated at work [7]. Other factors that may influence help-seeking attitudes include the perceived need for seeking treatment from professionals as well as the perceived helpfulness of the treatment [8][9].

The causal beliefs of mental illness are another potential factor to stigma and the reluctance to seek help [10][11]. Importantly, an individual's treatment preferences may be influenced by the causal beliefs about their symptoms, which may in turn lead them to seek help from inappropriate sources or even refraining from seeking help altogether [12][13]. For instance, individuals attributing symptoms of mental illness to supernatural causes are less likely to view professional mental health services as effective, and are more likely to seek culturally traditional

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or religious forms of healing [14]. A study by Bhikha et al. (2005) suggests that lay beliefs about the causes of mental illness informs help-seeking choices; where the majority of participants who endorsed a dual explanatory model (both supernatural and biological causes) for psychosis took both the prescribed medication and followed the treatment prescribed by a faith healer [15].

Rickwood et al. (2005) proposed a model for the process of help-seeking for mental health problems amongst young people. According to this model, help-seeking begins with an individual's awareness or appraisal of problems before expression of one's symptoms and needs to others, and finally the willingness to seek help from available sources [16]. Based on this model and the literature on the relationship between causal beliefs and help-seeking behaviors [9 12-14], a hypothesis can be formulated, namely; etiological beliefs of mental illness are probable determinants of help-seeking attitudes and intentions. Moreover, different causal attributions are likely to influence help-seeking behaviors and coping strategies towards mental illness differentially. Reducing the treatment gap, therefore, entails understanding and addressing the causal beliefs of mental illness in the context appropriate to the targeted audience.

The Singapore Mental Health Study conducted in 2016 found that the lifetime prevalence for a number of mental illnesses is 1 out of 7 people. Depression was found to be the most prevalent condition in this study, and youths emerged as the most vulnerable group for both lifetime and 12-month prevalence[17]. The treatment gap phenomenon is also particularly relevant to Singapore, where the 12-month treatment gap for several mental illnesses in Singapore is high (78.6%). Importantly, it has also been reported that those with higher education in Singapore are less likely to seek help [18]. Since attitudes towards help-seeking predict actual service use [4], such findings highlight a need to understand the factors that affect help-seeking amongst young people with higher education in Singapore.

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Although previous studies in Singapore have investigated causal beliefs of mental illness and help-seeking attitudes towards mental illness independently amongst the general public in Singapore [19] [20], the studies did not specifically sample young adults or investigate the relationship between the two constructs. Research has shown that both causal beliefs and help-seeking attitudes can vary according to cultural and sociodemographic differences [12] [14] [19-22]. As depression is the most prevalent condition among the 18-34 age group in Singapore, which covers young adults with higher education [17], understanding the causal beliefs of university students could be vital in reducing the treatment gap in this population.

In view of such findings, this study aims to examine the relationship between the causal beliefs about depression and help-seeking attitudes amongst university students in Singapore, taking into account their sociodemographic correlates.

2. METHODS

2.1 Participants and Procedures

This study employed a convenience sampling method. Data were collected from a total of 390 students in a university in Singapore, as part of a larger study called Advancing Research to Eliminate Mental Illness Stigma (ARTEMIS), which evaluated the effectiveness of an anti-stigma intervention. Participation in the ARTEMIS study entailed attending the anti-stigma intervention which comprised three components: a lecture on depression by a mental health professional which precedes a sharing session by a person with lived experience of mental illness, followed by a Q&A session led by an experienced psychiatrist. To assess the effectiveness of this intervention, participants filled up a pre-intervention questionnaire prior to the intervention (to establish baseline) and a post-intervention questionnaire immediately after

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the intervention. Subsequently, 3 months from the date of intervention, the participants were given yet another similar questionnaire to complete.

Participants for this study were recruited via an email invitation which was sent to students of various faculties within the university. Inclusion criteria were: 1) age between 18 to 35 years; 2) provision of informed consent, including parental consent for those below 21 as the age of majority in Singapore is 21 years; and 3) literacy in the English language. After providing written informed consent, participants were then handed a series of self-administered questionnaires. Questionnaires were all self-administered to minimize effect of social desirability bias. The self-administered questionnaires captured sociodemographic information of each respondent and evaluate aspects of his or her knowledge, beliefs and attitudes towards mental illness. The study was approved by the relevant institutional ethics committee, the Domain Specific Review Board of National Healthcare Group in Singapore. For the purpose of analysis in this paper, only sociodemographic information and baseline data collected from the Causal Beliefs about Mental Illness and Inventory of Attitudes towards Seeking Mental Health Services (IASMHS) questionnaires were used.

2.2 Instruments

Causal beliefs about mental illness

The scale used in this study to assess causal beliefs about mental illness was originally developed by Reavley and Jorm [10][20]. It comprises 10 items describing the plausible causes of the problem depicted using a vignette approach. Participants had to first read the vignette which described an adult man with symptoms of depression before responding to the items in the scale. Due to its cultural relevance, Pang et al's (2018) adaptation of the causal beliefs scale was used in this study. A 3-factor model was proposed for Pang et al's (2018) adapted scale, and the factors were

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'Physical', 'Personality' and 'Psychosocial'. Items that loaded on the 'Physical' factor comprised 'virus or infection' and 'allergy or reaction', while the "Personality" factor consisted of 'being a nervous person' and 'having a weak character', and the "Psychosocial" factor encompassed 'everyday problems such as stress, family arguments, difficulties at work or financial difficulties', 'recent death of a close friend or family', 'recent traumatic event such as a severe traffic accident' and 'childhood problems such as being badly treated or abused, losing one or both parents when young or coming from a broken home'.

Inventory of Attitudes Towards Seeking Mental Health Services

The Inventory of Attitudes Towards Seeking Mental Health Services (IASMHS) is a 24-items scale designed to measure an individual's attitudes towards seeking professional help for psychological issues and has been validated for use in a student population (IASMHS)[23]. Participants were asked to rate how much they agree or disagree with each of the items on a 5-point Likert scale ranging from 'disagree' to 'agree'. The original developer of the IASMHS identified a 3-factor structure for the scale, namely 'Psychological Openness' (the degree of an individual's openness to acknowledging one's own psychological problems and to seek professional help for it), 'Help-seeking propensity' (the extent of one's willingness as well as perceived ability to seek professional psychological help) and 'Indifference to stigma' (how concerned an individual will be about others discovering them seeking professional help for their problems). Higher scores on a factor signify a more positive opinion towards that particular dimension of help-seeking attitude. This 3-factor model of the IASMHS has also been validated recently by 2 other studies which employed different samples [24 25], suggesting that this factor-structure is rather robust.

2.3 Analysis

All analyses for this study were performed using SPSS version 23. Participants' responses to the items on the causal beliefs scale were ranked and coded such that 'very likely' = 5, 'likely' = 4, 'depends' = 3, 'unlikely' = 2, and 'very unlikely' = 1, while 'I don't know' responses were treated as missing data. Scores for each factor of the causal beliefs scale were derived by summing up the scores of items in each factor and dividing it by the number of items loaded on each respective factor. Higher scores on a factor represent stronger attribution to the factor as the cause of mental illness. Responses to the items in the IASMHS scale were also ranked and coded such that 'disagree' = 0, 'somewhat disagree' = 1, 'undecided' = 2, 'somewhat agree' = 3, and 'agree' = 4. Scores for each factor in the IASMHS scale were generated by summing up the scores of items in each factor.

To understand the effects of sociodemographic characteristics on the causal attribution of mental illness, three multivariate linear regression models were run separately using each of the causal beliefs factors as dependent variables, while sociodemographic variables such as age, gender, ethnicity and year of study, were treated as independent variables. Other independent variables comprise social contact with person(s) with mental illness such as having a close friend or family with mental illness and past experience in mental health field. In order to elucidate the impact of causal attributions on help-seeking attitudes, 3 multivariate linear regression models were performed using each of the IASMHS factors as the dependent variable, while the aforementioned variables with the addition of causal beliefs factors were treated as independent variables. Data were analyzed with the Statistical Package for Social Sciences V.23.0 (SPSS) and all statistically significant results are reported at $p \leq 0.05$.

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3. RESULTS

3.1 Descriptive Analysis

The demographic characteristics of our participants are shown in Table 1. The majority of participants were female (60.3%) and of Chinese ethnicity (82.8%). The mean (±SD) age of the participants was 22.8 ± 2.2 years. In terms of years of study in the university, 33.3% were in Year 1, 24.9% in Year 2, 20.3% in Year 3 and 21.5% were in Year 4. 42.6% of participants knew of at least 1 close friend or family member who has a mental illness, and 22.2% had past experience within the mental health field. 0.5% (n=2) had missing data for the variable past experience within the mental health field.

Table 1: Sociodemographic characteristics of participants. (n = 390)

		Mean	SD
Age		22.2	2.2
		N	%
Gender			
	Male	155	39.7
	Female	235	60.3
Ethnicity			
	Chinese	323	82.8
	Non-Chinese	67	17.2
Year of Study			
	Year 1	130	33.3
	Year 2	97	24.9
	Year 3	79	20.3
	Year 4	84	21.5
Close friend or family member who has a mental illness			
	Yes	166	42.6
	No	224	57.4
Past experience within mental health field			
	Yes	86	22.2
	No	301	77.8

3.2 Descriptive Statistics on Causal Beliefs of Depression

Table 2 lists the mean score of each causal attribution of depression. The mean score for the 3

factors of causal beliefs were 1.8 ± 0.8 for physical attribution (3.1% had missing data, n=12),

4.2 ± 0.5 for psychosocial attribution (2.3% had missing data, n=9) and 3.1 ± 1.0 for personality

attribution (7.7% had missing data, n=30).

Table 2: Descriptive statistics on the Causal Beliefs of Depression

	Physical	Psychosocial	Personality
Mean (SD)	1.8 (0.8)	4.2 (0.5)	3.1 (1.0)
Range	1.0 - 4.5	2.0 - 5.0	1.0 - 5.0

3.3 Multivariate Linear Regressions of Casual Beliefs Factors and Help-seeking Attitudes

Results from multivariate linear regressions found no significant sociodemographic predictors

for physical attribution of mental illness (Table 3). On the other hand, younger age significantly

predicted higher psychosocial attribution, while having close family or friends with mental

illness or past experience in the mental health scene were both negatively associated with

personality attribution.

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Table 3: Sociodemographic Correlates of 3 Causal Belief Factors

		Physical			Psychosocial			Personality	
	B	95% CI	p-value	β	95% CI	p-value	β	95% CI	p-value
Age	-0.018	-0.065 to 0.029	0.457	-0.035	-0.067 to -0.004	**0.029***	0.009	-0.048 to 0.065	0.757
Gender									
Male (Ref)									
Female	-0.041	-0.240 to 0.159	0.689	0.030	-0.104 to 0.163	0.665	0.149	-0.089 to 0.387	0.218
Ethnicity									
Chinese (Ref)									
Non-Chinese	0.086	-0.147 to 0.319	0.467	0.108	-0.045 to 0.261	0.167	0.250	-0.029 to 0.530	0.079
Years of Study									
Year 1 (Ref)									
Year 2	-0.223	-0.458 to 0.012	0.063	-0.034	-0.193 to 0.124	0.671	-0.145	-0.425 to 0.135	0.309
Year 3	-0.170	-0.430 to 0.089	0.198	-0.075	-0.249 to 0.099	0.397	-0.076	-0.384 to 0.231	0.626
Year 4	-0.073	-0.345 to 0.198	0.596	0.033	-0.150 to 0.215	0.726	-0.068	-0.390 to 0.254	0.677
Close friend or family with MI									
Yes	-0.170	-0.350 to 0.010	0.065	0.074	-0.047 to 0.194	0.231	-0.229	-0.444 to -0.015	**0.036***
No (Ref)									
Past Experience in mental health field									
Yes	0.052	-0.161 to 0.265	0.632	0.110	-0.033 to 0.253	0.130	-0.297	-0.551 to -0.044	**0.021***
No (Ref)									

* denotes significant association at p-value <0.05

With regards to help-seeking attitudes, multivariate linear regressions identified stronger psychosocial attribution to be associated with higher 'Help-seeking Propensity' whereas stronger personality attribution was linked to lower 'Psychological Openness' and 'Indifference to Stigma' (refer to Table 4). In addition, being a male was significantly associated with poorer scores on 'Psychological Openness' and 'Indifference to Stigma' while higher household income (SGD 10,000 or above vs. below SGD 2,000) was significantly associated with higher 'Psychological Openness' (refer to Table 4). 0.5%(n=2) of participants had missing data for 'Psychological Openness' factor, 0.3%(n=1) for 'Help-seeking Propensity', and 1.0%(n=4) for 'Indifference to Stigma'.

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Table 4: Multivariate Regression for Help-seeking Attitudes

	Psychological Openness			Help-seeking Propensity			Indifference to Stigma		
	β	95% CI	p-value	β	95% CI	p-value	β	95% CI	p-value
Age	0.190	-0.081 to 0.461	0.168	0.250	-0.021 to 0.520	0.070	0.236	-0.131 to 0.604	0.206
Gender									
Male (Ref)									
Female	2.310	1.163 to 3.458	**<0.001****	-0.759	-1.904 to 0.385	0.193	1.573	0.014 to 3.131	**0.048***
Ethnicity									
Chinese (Ref)									
Non-Chinese	-0.294	-1.681 to 1.093	0.677	1.343	-0.040 to 2.725	0.057	1.487	-0.404 to 3.378	0.123
Years of Study									
Year 1 (Ref)									
Year 2	0.225	-1.136 to 1.585	0.745	0.569	-0.787 to 1.925	0.410	-1.854	-3.696 to -0.011	**0.049***
Year 3	-0.552	-2.041 to 0.938	0.467	-0135	-1.620 to 1.351	0.859	-3.091	-5.119 to -1.064	**0.003****
Year 4	0.089	-1.470 to 1.647	0.911	0.773	-0.781 to 2.326	0.329	-1.969	-4.090 to 0.153	0.069
Close friend or family with MI									
Yes	2.532	1.479 to 3.585	**<0.001****	0.142	-0.908 to 1.192	0.791	0.949	-0.483 to 2.380	0.193
No (Ref)									
Past Experience in mental health field									
Yes	20.70	0.829 to 3.310	**0.001****	1.602	0.365 to 2.839	**0.011***	0.463	-1.219 to 2.146	0.588
No (Ref)									
Causal Beliefs									
Physical	-0.301	-0.897 to 0.295	0.321	0.086	-0.508 to 0.681	0.776	-0.640	-1.449 to 0.170	0.121
Psychosocial	-0.083	-0.965 to 0.799	0.853	1.252	0.373 to 2.132	**0.005****	-0.045	-1.242 to 1.152	0.941
Personality	-1.133	-1.650 to -0.616	**<0.001****	0.002	-0.513 to 0.518	0.993	-0.711	-1.417 to -0.005	**0.048***

* denotes significant association at *p-value* <0.05
** denotes significant association at *p-value* <0.01

4. DISCUSSION

Consistent with the findings of the study by Pang et al. (2018), physical causes (μ =1.86 ± 0.85) was the least endorsed attribution of depression amongst our participants, followed by personality causes (μ =3.18 ± 1.00) and psychosocial causes (μ = 4.25 ± 0.57). Pang et al. (2018) also found age differences in psychosocial beliefs, with older adults (35-49 years) being less likely than younger adults (18-34 years) to endorse psychosocial beliefs. Several studies have reported that endorsement of psychosocial causes of depression such as negative life events,

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broken home, lack of parental affection, and death of someone close, reduces stigma and the desire for social distance [26-28]. Since causal attributions are linked to stigma [7 10] and younger adults tend to show less stigma towards mental illness [27 29], this possibly explains the age differences in psychosocial beliefs observed in our study. Taking into consideration the narrow age range of our participants, the age differences observed in our study perhaps reflect the improvements of awareness initiatives that were integrated into educational settings over the years.

With regards to help-seeking attitudes, our multiple linear regression analysis found several significant associations between subscales of IASMHS and sociodemographic factors, as well as between subscales of IASMHS and causal attribution of mental illness.

Having a close friend/family member with mental illness and past experience in the mental health field were both associated with lower scores on personality attribution, and this could be due to the effects of social contact with individuals who have mental illness. As intergroup contact has been suggested to improve mental health literacy, increase empathy and reduce stigma [30], this finding may be tied to participants having a better understanding about the multifactorial causes of depression and knowing that it is unlikely to be caused by just a 'weak or nervous personality'.

Interestingly, having a close friend/family with mental illness and past experience in mental health field were also significantly correlated to "Psychological Openness" scores, but only past experience in mental health field were significantly correlated to "Help-seeking Propensity" scores. A plausible explanation would be that intergroup contact helped to reduce stigma and thus promoted participant's willingness to acknowledge their psychological challenges and be open about it. However, "Help-seeking Propensity" measures participant's knowledge of where

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to seek help and their perceived capability/willingness to do so. In which case, intergroup contact with just friends/family with mental illness may not necessarily enhance their "Help-seeking Propensity". On the other hand, having past experience in the mental health field would arguably improve their mental health literacy, thereby positively influencing their knowledge of where and when to seek help, as well as the perceived helpfulness of doing so. Nonetheless, further research may be needed to explore this phenomenon of how different forms of social contact affects help-seeking differentially.

Consistent with the extant literature, our study found a gender bias in help-seeking attitudes [22] [31] [32], with females scoring significantly higher in "Psychological Openness" and "Indifference to Stigma" than their male counterparts. The gender differences in our findings might be due to cultural ideologies of masculinity [33] where admitting that one has a mental health problem is akin to revealing one's weaknesses, and this is compounded by the perception that people who seek psychological treatment are often stereotyped as "weak"[7]. This possibly explains why males in the study were less open to acknowledging their psychological problems if any, at the same time feeling more apprehensive about others finding out should they seek treatment.

Our analysis also showed that attributing the cause of depression to an individual's personality is linked to lower "Psychological Openness" and "Indifference to Stigma". This inverse relationship between personality attribution and the two aforementioned help-seeking factors could be related to stigma. A study by Reavley and Jorm (2014) established that the belief in personality being a cause of mental illnesses is associated with higher personal *weak not sick* stigma [10]. As such, attributing the cause of mental illness to a 'weak or nervous' personality is likely to engender denial towards one's condition, for it implies that mental illness is within a person's control (*weak*) and not a genuine medical issue (*not sick*) [19] [34]. This could results in self-

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blame and feelings of shame, which consequently leads to greater self-stigma and difficulty in acknowledging one's mental health problems [35-37], as well as greater consternation about others knowing should they seek treatment.

Personality attribution may also exacerbate the denial of one's condition especially in Asian cultures where having a mental illness is commonly seen as a disgrace to the family. A case in point would be the Chinese culture, where a mental illness is seen as a mark of shame that "tarnishes family honour, name and ancestors" [38]. In this case, personality attribution is likely to invoke feelings of blame and guilt on the sufferer for being unable to 'endure' one's problem, consequently fostering a strong antipathy towards acknowledging one's condition. Further, the belief that one can handle their symptoms on their own has been found to affect help-seeking intentions [8 16 39]. As such, the belief that mental illness is due to a "weak or nervous" personality might inhibit an individual's openness to the idea of seeking help, especially so in cultures where seeking treatment is viewed as "a lack of endurance, personality strength and dignity" [38]. Conceivably, in such scenarios, individuals would face greater inertia in confronting their psychological issues (lower "Psychological Openness"), and also perceive greater stigma in seeking treatment (lower "Indifference to Stigma").

In contrast, higher "Help-seeking Propensity" scores were linked to greater endorsement of psychosocial attribution. The perceived need for psychological treatment from professionals and the perceived helpfulness of doing so has been shown to influence help-seeking attitudes [8 9] with individuals who endorsed psychosocial attributions being more likely to regard it as a treatable condition [40], and are therefore more willing to seek treatment. An alternative explanation could be linked to how psychosocial causes (i.e. childhood maltreatment and trauma) alludes to external factors that are beyond an individual's control. It has been shown that attribution of

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mental illness to external factors is positively associated with help-seeking [41], possibly because it evokes less self-afflicted blame and guilt on the individual. Furthermore, as mentioned above, several studies have reported that endorsement of psychosocial causes of depression reduces stigma and desire for social distance [26-28]. Based on these findings, it can be postulated that when mental illness is attributed to psychosocial causes, individuals may be more willing to seek help as they perceive less stigma associated with the illness.

Another interesting finding is that as university students progress in their year of study in the school, their scores on "Indifference to Stigma" tend to decrease. A possible explanation could be due to the fear of being labelled because of the perception others may have toward those with mental illness, regarding them as less competent [7 42]. Thus, students may worry about their peers finding out that they are seeking treatment and thereby perceiving them as weak or burdensome individuals who are unable to contribute sufficiently in projects/assignments. Alternatively, it may be that as students gradually progress in university, they tend to have larger social network in school. Hence, there would be greater concern about others finding out that they are seeking treatment because of the stigma associated with the label [42] and the fear of losing their social standings in school.

Several studies which had also utilized the IASMHS demonstrated help-seeking propensity to be the greatest factor out of the three to predict mental health service use [24 25 32]. Notably, it is recommended for future interventions targeting university students to emphasize more on psychosocial causes of mental illness, while addressing the beliefs that attribute mental illness to the personality of the individual, given its impairments on help-seeking attitudes. Importantly, our study also found that having social contact with individuals with mental illness reduces attribution towards personality as a cause of mental illness. As such, it would be beneficial for

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future anti-stigma interventions or mental health literacy programs to also incorporate social contact with people who have mental illness, in order to challenge misconceptions towards mental illnesses [30]. In view of these considerations, and given that young people are most at risk of developing mental illness[17], there is perhaps a need for mental health literacy to be introduced earlier to youths.

There were some limitations to our study worth mentioning. Because our study utilized convenience sampling, we had to compare between two broad ethnic groups i.e., Chinese versus non-Chinese as we did not have enough participants to represent the other major local ethnic groups (Malays and Indians). Hence, we were unable to elucidate the influence that other ethnic cultures may have on causal beliefs and help-seeking. The generalizability of our finding is another limitation. Since we used only the depression vignette in our study, our findings may not necessarily translate to other mental illnesses; and as our sample only comprised University students, our findings might not be indicative of youths in other settings.

Notwithstanding these limitations, findings from our study provide some useful insights on the relationship between causal beliefs and help-seeking attitudes amongst young people in University. Future similar research should target young people in other settings, and to examine ethnic differences in causal beliefs and help-seeking behavior. Also, future studies could look into other causal beliefs of mental illness (such as biogenetics and supernatural causes, which were not investigated in this study) and how stigma moderates the relationship between causal beliefs of mental illness and help-seeking attitude.

Findings from our study have several implications. Firstly, the design of interventions to improve help-seeking attitudes amongst university students should consider the receptivity of male students, given that they have less positive help-seeking attitudes than their female counterparts.

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Secondly, our findings have shown the importance of causal beliefs on help-seeking attitudes. In order to mitigate the wide treatment gap amongst young people, future anti-stigma interventions should also focus on addressing the causes of mental illness. Finally, to better ameliorate the misconceptions regarding the causes of mental illness and correct stereotypes, anti-stigma interventions should also incorporate contact with an individual who has mental illness, and mental health literacy should be introduced to youths as early as possible.

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

	Item No	Recommendation	Page No
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	2-3
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4-6
Objectives	3	State specific objectives, including any prespecified hypotheses	6
Methods			
Study design	4	Present key elements of study design early in the paper	6-7
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	6-7
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	7
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	N.A
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	7-8
Bias	9	Describe any efforts to address potential sources of bias	7
Study size	10	Explain how the study size was arrived at	N.A
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	9
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	9
		(*b*) Describe any methods used to examine subgroups and interactions	N.A
		(*c*) Explain how missing data were addressed	N.A (Linear regression automatically handles missing data)
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	N.A
		(*e*) Describe any sensitivity analyses	N.A
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	7
		(b) Give reasons for non-participation at each stage	N.A

		(c) Consider use of a flow diagram	N.A
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	10-11
		(b) Indicate number of participants with missing data for each variable of interest	10-12
Outcome data	15*	Report numbers of outcome events or summary measures	11-12
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	9-12
		(*b*) Report category boundaries when continuous variables were categorized	N.A
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N.A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	N.A
Discussion			
Key results	18	Summarise key results with reference to study objectives	13-14
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	18
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	18-19
Generalisability	21	Discuss the generalisability (external validity) of the study results	18
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	22

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Title: Causal Beliefs of Mental Illness and its Impact on Help-seeking Attitudes: A cross-sectional study among university students in Singapore

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Abstract

Objectives: A considerable proportion of those who suffer from mental illnesses in Singapore do not seek any form of professional help. The reluctance to seek professional help could be due to misconceptions about the causes of mental illnesses. Research has shown that help-seeking attitudes can predict actual service use. As young adults are most at risk of developing mental illness, this study aims to elucidate the impact of causal beliefs about mental illness on help-seeking attitudes amongst university students in Singapore.

Design: Prior to attending an anti-stigma intervention, data on the Causal Beliefs about Mental Illness, Inventory of Attitudes towards Seeking Mental Health services, and questions pertaining to sociodemographic background were collected from participants using a self-administered questionnaire. Multiple linear regressions were performed to examine the relationship between causal beliefs and help-seeking, as well as their sociodemographic correlates.

Settings: A university in Singapore

Participants: 390 students who were studying at a Singapore's University at the time of recruitment.

Results: Younger age was associated with higher scores on psychosocial attribution, while prior social contact with individuals with mental illness was significantly associated with lower scores on personality attribution. With regard to help-seeking attitudes; being a male and personality attribution were significantly associated with lower scores on 'Psychological Openness' and 'Indifference to Stigma', while psychosocial attribution was significantly associated with higher scores on 'Help-seeking Propensity'. Having prior social contact also predicted higher

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'Psychological Openness', while being in Year 2 and 3 predicted lower scores on 'Indifference to Stigma'.

Conclusion: Findings from this study suggest that help-seeking attitudes might be influenced by causal beliefs, with personality attribution being the most impairing. Hence, to reduce the wide treatment gap in Singapore, anti-stigma interventions targeting young people could focus on addressing beliefs that attribute mental illness to the personality of the individual.

<u>**Strengths and Limitations**</u>

- A vignette-based approach was adopted to assess causal attributions relating to depression, allows comparison to other studies which also employs vignette-based approach.

- This is the first study to examine the relationship between causal beliefs of mental illness and help-seeking attitudes using a sample of university students in Singapore.

- As only the depression vignette was used for this study, the findings for this study may not be generalizable towards other mental illnesses.

- As convenience sampling was adopted for this study, majority of participants recruited were Chinese and the study team was unable to recruit an adequate number of participants to represent the other major local ethnic groups in Singapore, to better reflect the influence of culture on causal beliefs and help-seeking.

- As the study is voluntary, there may be self-selection bias, as attitudes and knowledge of non-responders may differ from participants, which may not be possible to capture from this study.

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INTRODUCTION

Mental illness poses a greater global economic burden than chronic somatic diseases, with an estimated economic cost of US$2.5 trillion worldwide, and this is expected to double by 2030 [1]. Despite the high prevalence of mental disorders and the considerable disease burden caused by it, many individuals with mental illness remain untreated resulting in a treatment gap that is wider than that in any other health sector [1]. Furthermore, untreated mental disorders could result in severe ramifications for the individual. For instance, a person suffering from a single disorder –if not treated in time- may go on to develop more serious symptoms and other complex comorbid conditions that complicate the treatment regimen [2][3].

Attitudes towards help-seeking, which includes the beliefs and willingness to seek help, have been shown to predict help-seeking behavior [4]. Given the implications of the wide treatment gap for mental disorders, it is important to understand the factors that influence an individual's help-seeking attitudes. Often, the underutilization of mental health services can be due to stigma [5][6]. Stigma is commonly defined as a denigrating attribute that brings about mark of shame on the carrier [7], which typically leads to stereotype, prejudice and discrimination towards the individual [8]. Stigma may impair an individual's attitudes towards seeking help insomuch that an individual may avoid seeking treatment due to their aversion towards being labelled with a mental illness (label avoidance) and its negative consequences, such as becoming ostracized or discriminated at work [9]. Other factors that may influence help-seeking attitudes include the perceived need for seeking treatment from professionals as well as the perceived helpfulness of the treatment [10][11].

The causal beliefs of mental illness are another potential factor leading to stigma and the reluctance to seek help [12][13]. Importantly, an individual's treatment preferences may be influenced by the causal beliefs about their symptoms, which may in turn lead them to seek help

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from inappropriate sources or even refraining from seeking help altogether [14] [15]. For instance, individuals attributing symptoms of mental illness to supernatural causes are less likely to view professional mental health services as effective, and are more likely to seek culturally traditional or religious forms of healing [16]. A study by Bhikha et al. (2005) suggests that lay beliefs about the causes of mental illness informs help-seeking choices; where the majority of participants who endorsed a dual explanatory model (both supernatural and biological causes) for psychosis took both the prescribed medication and followed the treatment prescribed by a faith healer [17].

Rickwood et al. (2005) proposed a model for the process of help-seeking for mental health problems amongst young people. According to this model, help-seeking begins with an individual's awareness or appraisal of problems before expression of one's symptoms and needs to others, and finally the willingness to seek help from available sources [18]. Based on this model and the literature on the relationship between causal beliefs and help-seeking behaviors [11] [14-16], a hypothesis can be formulated, namely; etiological beliefs of mental illness are probable determinants of help-seeking attitudes and intentions. Moreover, different causal attributions are likely to influence help-seeking behaviors and coping strategies towards mental illness differentially. Reducing the treatment gap, therefore, entails understanding and addressing the causal beliefs of mental illness in the context appropriate to the targeted audience.

The Singapore Mental Health Study conducted in 2016 found that the lifetime prevalence for mental disorders was 13.9%. Depression was found to be the most prevalent condition in this study, and youths emerged as the most vulnerable group for both lifetime and 12-month prevalence [19]. The phenomenon of treatment gap is particularly relevant to Singapore, as the 12-month treatment gap for several mental illnesses in Singapore is high (78.6%). Importantly, it has also been reported that those with higher education in Singapore are less likely to seek help

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[20]. Since attitudes towards help-seeking predict actual service use [21], such findings highlight a need to understand the factors that affect help-seeking amongst young people with higher education in Singapore.

Previous studies in Singapore have investigated causal beliefs of mental illness where it was reported that psychosocial causes were the most likely to be attributed to mental disorders, followed by personality and physical causes [22][23]. However, these studies did not specifically sample young adults or investigate the relationship between causal beliefs and help-seeking attitudes. Research has shown that both causal beliefs and help-seeking attitudes can vary according to cultural and socio-demographic differences [14][16][22-25]. As depression is the most prevalent condition among the 18-34 age group in Singapore, understanding the causal beliefs of university students could be vital in reducing the treatment gap in this population.

In view of such findings, this study aims to examine the relationship between the causal beliefs about depression and help-seeking attitudes amongst university students in Singapore, taking into account their socio-demographic correlates.

2. METHODS

2.1 Participants and Procedures

This study employed a convenience sampling method. Data were collected from a total of 390 students in a university in Singapore, as part of a larger study called Advancing Research to Eliminate Mental Illness Stigma (ARTEMIS), which evaluated the effectiveness of an anti-stigma intervention. However, as the aim of this paper is purely to examine the relationship between causal beliefs of mental illness and help-seeking attitudes among Singapore's university

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students, only socio-demographic information and baseline data collected prior to the intervention were used.

Participants for this study were recruited via an e-mail invitation that sent to students of various faculties within the University. Inclusion criteria were: 1) age between 18 to 35 years; 2) provision of informed consent, including parental consent for those below 21 as the age of majority in Singapore is 21 years; and 3) literacy in the English language. After providing written informed consent, participants were asked to fill up a series of self-administered questionnaires. The questionnaires were self-administered to minimize the effect of social desirability bias. The self-administered questionnaires included the Causal Beliefs about Mental Illness and the Inventory of Attitudes towards Seeking Mental Health Services (IASMHS). Socio-demographic information of the respondents was also captured using a short questionnaire. The study was approved by the relevant institutional ethics committee, the Domain Specific Review Board of National Healthcare Group in Singapore.

2.2 Instruments

Causal beliefs about mental illness

The scale used in this study to assess causal beliefs about mental illness was originally developed by Reavley and Jorm [12][23]. It comprises ten items describing the plausible causes of the problem depicted using a vignette approach. Participants had to first read the vignette which described an adult man with symptoms of depression (see Appendix A for more information on vignette) before responding to the items in the scale. Due to its cultural relevance, Pang et al's (2018) adaptation of the causal beliefs scale was used in this study. A 3-factor model was proposed for Pang et al's (2018) adapted scale, and the factors were 'Physical', 'Personality' and 'Psychosocial'. Items that loaded on the 'Physical' factor comprised 'virus or infection' and

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'allergy or reaction', while the 'Personality' factor consisted of 'being a nervous person' and 'having a weak character', and the 'Psychosocial' factor encompassed 'everyday problems such as stress, family arguments, difficulties at work or financial difficulties', 'recent death of a close friend or family', 'recent traumatic event such as a severe traffic accident' and 'childhood problems such as being badly treated or abused, losing one or both parents when young or coming from a broken home'.

Inventory of Attitudes Towards Seeking Mental Health Services

The Inventory of Attitudes Towards Seeking Mental Health Services (IASMHS) is a 24-items scale designed to measure an individual's attitudes towards seeking professional help for psychological issues and has been validated for use in a student population (IASMHS)[26]. Participants were asked to rate how much they agree or disagree with each of the items on a 5-point Likert scale ranging from 'disagree' to 'agree'. The original developer of the IASMHS identified a 3-factor structure for the scale, namely 'Psychological Openness' (the degree of an individual's openness to acknowledging one's own psychological problems and to seek professional help for it), 'Help-seeking propensity' (the extent of one's willingness as well as perceived ability to seek professional psychological help) and 'Indifference to stigma' (how concerned an individual will be about others discovering them seeking professional help for their problems). Higher scores on a factor signify a more positive opinion towards that particular dimension of help-seeking attitude. This 3-factor model of the IASMHS has also been validated recently by 2 other studies which employed different samples [27 28], suggesting that this factor-structure is rather robust.

2.3 Analysis

All analyses for this study were performed using SPSS version 23. Participants' responses to the

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items on the causal beliefs scale were ranked and coded such that 'very likely' = 5, 'likely' = 4, 'depends' = 3, 'unlikely' = 2, and 'very unlikely' = 1, while 'I don't know' responses were treated as missing data. Scores for each factor of the causal beliefs scale were derived by summing up the scores of items in each factor and dividing it by the number of items loaded on each respective factor. Higher scores on a factor represent stronger attribution to the factor as the cause of mental illness. Responses to the items in the IASMHS scale were also ranked and coded such that 'disagree' = 0, 'somewhat disagree' = 1, 'undecided' = 2, 'somewhat agree' = 3, and 'agree' = 4. Scores for each factor in the IASMHS scale were generated by summing up the scores of items in each factor.

To understand the effects of sociodemographic characteristics on the causal attribution of mental illness, three multivariate linear regression models were run separately using each of the causal belief factors as dependent variables, while sociodemographic variables such as age, gender, ethnicity and year of study, were treated as independent variables. Other independent variables comprise social contact with a person(s) with mental illness such as having a close friend or family with mental illness and past experience in the mental health field. In order to elucidate the impact of causal attributions on help-seeking attitudes, three multivariate linear regression models were performed using each of the IASMHS factors as the dependent variable, while the aforementioned variables with the addition of causal beliefs factors were treated as independent variables. Data were analyzed with the Statistical Package for Social Sciences V.23.0 (SPSS) and all statistically significant results are reported at $p < 0.05$.

2.4 Patient and Public Involvement

No patient involved.

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3. RESULTS

3.1 Descriptive Analysis

The demographic characteristics of our participants are shown in Table 1. The majority of participants were female (60.3%) and of Chinese ethnicity (82.8%). The mean (±SD) age of the participants was 22.8 ± 2.2 years. In terms of years of study in the university, 33.3% were in Year 1, 24.9% in Year 2, 20.3% in Year 3 and 21.5% were in Year 4. 42.6% of participants knew of at least one close friend or family member who has a mental illness, and 22.2% had past experience within the mental health field. 0.5% (n=2) had missing data for the variable past experience within the mental health field.

Table 1: Sociodemographic characteristics of participants. (n = 390)

		Mean	SD
Age		22.2	2.2
		N	%
Gender			
	Male	155	39.7
	Female	235	60.3
Ethnicity			
	Chinese	323	82.8
	Non-Chinese	67	17.2
Year of Study			
	Year 1	130	33.3
	Year 2	97	24.9
	Year 3	79	20.3
	Year 4	84	21.5
Close friend or family member who has a mental illness			
	Yes	166	42.6
	No	224	57.4
Past experience within mental health field			
	Yes	86	22.2
	No	301	77.8

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3.2 Descriptive Statistics on Causal Beliefs of Depression

Table 2 lists the mean score of each causal attribution of depression. The mean score for the 3

factors of causal beliefs were 1.8 ± 0.8 for physical attribution (3.1% had missing data, n=12),

4.2 ± 0.5 for psychosocial attribution (2.3% had missing data, n=9) and 3.1 ± 1.0 for personality

attribution (7.7% had missing data, n=30).

Table 2: Descriptive statistics on the Causal Beliefs of Depression

	Physical	Psychosocial	Personality
Mean (SD)	1.8 (0.8)	4.2 (0.5)	3.1 (1.0)
Range	1.0 - 4.5	2.0 - 5.0	1.0 - 5.0

3.3 Multivariate Linear Regressions of Casual Beliefs Factors and Help-seeking Attitudes

Results from multivariate linear regressions found no significant socio-demographic predictors

for physical attribution of mental illness (Table 3). On the other hand, younger age significantly

predicted higher psychosocial attribution, while having close family or friends with mental

illness or past experience in the mental health scene were both negatively associated with

personality attribution.

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Table 3: Sociodemographic Correlates of 3 Causal Belief Factors

		Physical				Psychosocial				Personality	
	B	95% CI	p-value	β	95% CI	p-value	β	95% CI	p-value
Age	-0.018	-0.065 to 0.029	0.457	-0.035	-0.067 to -0.004	**0.029***	0.009	-0.048 to 0.065	0.757
Gender									
Male (Ref)									
Female	-0.041	-0.240 to 0.159	0.689	0.030	-0.104 to 0.163	0.665	0.149	-0.089 to 0.387	0.218
Ethnicity									
Chinese (Ref)									
Non-Chinese	0.086	-0.147 to 0.319	0.467	0.108	-0.045 to 0.261	0.167	0.250	-0.029 to 0.530	0.079
Years of Study									
Year 1 (Ref)									
Year 2	-0.223	-0.458 to 0.012	0.063	-0.034	-0.193 to 0.124	0.671	-0.145	-0.425 to 0.135	0.309
Year 3	-0.170	-0.430 to 0.089	0.198	-0.075	-0.249 to 0.099	0.397	-0.076	-0.384 to 0.231	0.626
Year 4	-0.073	-0.345 to 0.198	0.596	0.033	-0.150 to 0.215	0.726	-0.068	-0.390 to 0.254	0.677
Close friend or family with MI									
Yes	-0.170	-0.350 to 0.010	0.065	0.074	-0.047 to 0.194	0.231	-0.229	-0.444 to -0.015	**0.036***
No (Ref)									
Past Experience in mental health field									
Yes	0.052	-0.161 to 0.265	0.632	0.110	-0.033 to 0.253	0.130	-0.297	-0.551 to -0.044	**0.021***
No (Ref)									

* denotes significant association at p-value <0.05

With regards to help-seeking attitudes, multivariate linear regressions identified stronger psychosocial attribution to be associated with higher 'Help-seeking Propensity' whereas stronger personality attribution was linked to lower 'Psychological Openness' and 'Indifference to Stigma' (refer to Table 4). In addition, being a male was significantly associated with poorer scores on 'Psychological Openness' and 'Indifference to Stigma', while participant's year of study and 'Indifference to Stigma' scores had an inverse relationship. Lastly, past experience in mental health field was significantly associated with both 'Psychological Openness' and 'Help-seeking Propensity' while having a close friend/relative with mental illness was only significantly associated with 'Psychological Openness'. (refer to Table 4). 0.5%(n=2) of

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participants had missing data for 'Psychological Openness' factor, 0.3%(n=1) for 'Help-seeking Propensity', and 1.0%(n=4) for 'Indifference to Stigma'.

Table 4: Multivariate Regression for Help-seeking Attitudes

	Psychological Openness				Help-seeking Propensity			Indifference to Stigma	
	β	95% CI	p-value	β	95% CI	p-value	β	95% CI	p-value
Age	0.190	-0.081 to 0.461	0.168	0.250	-0.021 to 0.520	0.070	0.236	-0.131 to 0.604	0.206
Gender									
Male (Ref)									
Female	2.310	1.163 to 3.458	<0.001**	-0.759	-1.904 to 0.385	0.193	1.573	0.014 to 3.131	0.048*
Ethnicity									
Chinese (Ref)									
Non-Chinese	-0.294	-1.681 to 1.093	0.677	1.343	-0.040 to 2.725	0.057	1.487	-0.404 to 3.378	0.123
Years of Study									
Year 1 (Ref)									
Year 2	0.225	-1.136 to 1.585	0.745	0.569	-0.787 to 1.925	0.410	-1.854	-3.696 to -0.011	0.049*
Year 3	-0.552	-2.041 to 0.938	0.467	-0135	-1.620 to 1.351	0.859	-3.091	-5.119 to -1.064	0.003**
Year 4	0.089	-1.470 to 1.647	0.911	0.773	-0.781 to 2.326	0.329	-1.969	-4.090 to 0.153	0.069
Close friend or family with MI									
Yes	2.532	1.479 to 3.585	<0.001**	0.142	-0.908 to 1.192	0.791	0.949	-0.483 to 2.380	0.193
No (Ref)									
Past Experience in mental health field									
Yes	20.70	0.829 to 3.310	0.001**	1.602	0.365 to 2.839	0.011*	0.463	-1.219 to 2.146	0.588
No (Ref)									
Causal Beliefs									
Physical	-0.301	-0.897 to 0.295	0.321	0.086	-0.508 to 0.681	0.776	-0.640	-1.449 to 0.170	0.121
Psychosocial	-0.083	-0.965 to 0.799	0.853	1.252	0.373 to 2.132	0.005**	-0.045	-1.242 to 1.152	0.941
Personality	-1.133	-1.650 to -0.616	<0.001**	0.002	-0.513 to 0.518	0.993	-0.711	-1.417 to -0.005	0.048*

* denotes significant association at *p-value* <0.05
** denotes significant association at *p-value* <0.01

4. DISCUSSION

Consistent with the findings of the study by Pang et al. (2018), physical causes (μ =1.86 ± 0.85) was the least endorsed attribution of depression amongst our participants, followed by personality causes (μ =3.18 ± 1.00) and psychosocial causes (μ = 4.25 ± 0.57). Pang et al. (2018) also found age differences in psychosocial beliefs, with older adults (35-49 years) being less likely than younger adults (18-34 years) to endorse psychosocial beliefs. Several studies have

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reported that endorsement of psychosocial causes of depression such as negative life events, broken homes, and lack of parental affection, reduces stigma and the desire for social distance [29-31]. Since causal attributions are linked to stigma [9 12] and younger adults tend to show less stigma towards mental illness [30 32], this possibly explains the age differences in psychosocial beliefs observed in our study. Taking into consideration the narrow age range of our participants, the age differences found in our study perhaps reflect the improvements of awareness initiatives that were integrated within educational settings over the years.

With regards to help-seeking attitudes, our multiple linear regression analysis found several significant associations between subscales of IASMHS and socio-demographic factors, as well as between subscales of IASMHS and causal attribution of mental illness.

Having a close friend/family member with mental illness and past experience in the mental health field were both associated with lower scores on personality attribution, and this could be due to the effects of social contact with individuals who have mental illness. Intergroup contact has been suggested to improve mental health literacy, increase empathy and reduce stigma [33]. Hence, this finding may be tied to participants having a better understanding about the multifactorial causes of depression, and knowing that it is unlikely to be caused by just a 'weak or nervous personality'.

Interestingly, having a close friend/family with mental illness and past experience in the mental health field were also significantly correlated to "Psychological Openness" scores, but only past experience in mental health field was significantly correlated to "Help-seeking Propensity" scores. A plausible explanation would be that intergroup contact helped to reduce stigma and thus promoted participant's willingness to acknowledge their psychological challenges and be open about it. However, "Help-seeking Propensity' measures participant's knowledge of where

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to seek help and their perceived capability/willingness to do so. In which case, intergroup contact with just friends/family with mental illness may not necessarily enhance their 'Help-seeking Propensity'. On the other hand, having past experience in the mental health field would arguably improve their mental health literacy, thereby positively influencing their knowledge of where and when to seek help, as well as the perceived helpfulness of doing so. Nonetheless, further research may be needed to explore this phenomenon of how different forms of social contact affect help-seeking differentially.

Consistent with the extant literature, our study found a gender bias in help-seeking attitudes [25] [34] [35], with females scoring significantly higher in "Psychological Openness" and "Indifference to Stigma" than their male counterparts. The gender differences in our findings might be due to cultural ideologies of masculinity [36] where admitting that one has a mental health problem is akin to revealing one's weaknesses, and this is compounded by the perception that people who seek psychological treatment are often stereotyped as "weak"[9]. This possibly explains why males in the study were less open to acknowledging their psychological problems if any, and at the same time more apprehensive about others finding out should they seek treatment.

Our analysis also showed that attributing the cause of depression to an individual's personality was associated with lower "Psychological Openness" and "Indifference to Stigma". This negative association between personality attribution and the two aforementioned help-seeking factors could be related to stigma. A study by Reavley and Jorm (2014) established that the belief in personality being a cause of mental illnesses is associated with higher personal *weak not sick* stigma [12]. As such, attributing the cause of mental illness to a 'weak or nervous' personality is likely to engender denial towards one's condition, for it implies that mental illness is within a person's control (*weak*) and not a genuine medical issue (*not sick*) [22] [37]. This could results in self-

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blame and feelings of shame, which consequently leads to greater self-stigma and difficulty in acknowledging one's mental health problems [38-40], as well as greater consternation about others knowing should they seek treatment.

Personality attribution may also exacerbate the denial of one's condition especially in Asian cultures where having a mental illness is commonly seen as a disgrace to the family. A case in point would be the Chinese culture, where a mental illness is seen as a mark of shame that "tarnishes family honour, name and ancestors" [41]. In this case, personality attribution is likely to invoke feelings of blame and guilt on the sufferer for being unable to 'endure' one's problem, consequently fostering a strong antipathy towards acknowledging one's condition. Further, the belief that one can handle their symptoms on their own has been found to affect help-seeking intentions [10 18 42]. As such, the belief that mental illness is due to a "weak or nervous" personality might inhibit an individual's openness to the idea of seeking help, especially so in cultures where seeking treatment is viewed as "a lack of endurance, personality strength and dignity" [41]. Conceivably, in such scenarios, individuals would face greater inertia in confronting their psychological issues (lower "Psychological Openness"), and also perceive greater stigma in seeking treatment (lower "Indifference to Stigma").

In contrast, higher "Help-seeking Propensity" scores were linked to greater endorsement of psychosocial attribution. The perceived need for psychological treatment from professionals and the perceived helpfulness of doing so has been shown to influence help-seeking attitudes [10 11] with individuals who endorsed psychosocial attributions being more likely to regard it as a treatable condition [43], and are therefore more willing to seek treatment. An alternative explanation could be linked to how psychosocial causes (i.e. childhood maltreatment and trauma) alludes to external factors that are beyond an individual's control. It has been shown that

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attribution of mental illness to external factors is positively associated with help-seeking [44], possibly because it evokes less self-afflicted blame and guilt within the individual. Furthermore, as mentioned above, several studies have reported that endorsement of psychosocial causes of depression reduces stigma and desire for social distance [29-31]. Based on these findings, it can be postulated that when mental illness is attributed to psychosocial causes, individuals may be more willing to seek help as they perceive less stigma associated with the illness.

Another interesting finding is that as university students progress in their year of study in the school, their scores on "Indifference to Stigma" tend to decrease. A possible explanation could be due to the fear of being labelled which in turn may lead to others regarding them as less competent [9 45]. Thus, students may worry about their peers finding out that they are seeking treatment and thereby perceive them as weak or burdensome individuals who are unable to contribute sufficiently in projects/assignments. Alternatively, it may be that as students gradually progress in University, they tend to have larger social networks in school. Hence, there would be greater concern about others finding out that they are seeking treatment because of the stigma associated with the label [45] and the fear of losing their social standing in school.

Similar findings in terms of the association between causal attribution of mental illnesses and help-seeking attitudes have been reported in previous studies [14 46]. Chen and Mak's (2008) study, which also comprised undergraduate students, reported that help-seeking likelihood was positively correlated to attribution of mental illness to environmental/hereditary causes and negatively correlated to social-personal causes [14]. This corroborates our study's finding that help-seeking attitudes are more likely to be unfavorable when the etiological cause of mental illness is attributed to person-related reasons, whereas attributing mental illness to psychosocial reasons, likely encourages help-seeking. However, another study that investigated the relationship

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between causal beliefs of mental illness and help-seeking attitudes among a sample of persons with untreated depressive syndromes had slightly dissimilar results [46]. The study found that lower attribution to person-related causes was linked to greater perceived need for help among participants with prior treatment experience. In contrast, attribution to biomedical causes was related to greater perceived need and stronger help-seeking intentions among participants without prior treatment experience. On the contrary, attributions to childhood trauma or stress - which were more related to our psychosocial factor- were not significantly associated with help-seeking in this study. A juxtapose of these two previous studies with the current one hence suggests that attribution of mental illness to person-related causes may have quite a universal impact on help-seeking, whereas the same may not be said for psychosocial causes.

Several studies which had also utilized the IASMHS demonstrated "Help-seeking Propensity" to be the greatest factor out of the three to predict mental health service use [27 28 35]. Notably, it is recommended for future interventions targeting university students to emphasize more on psychosocial causes of mental illness, while addressing the beliefs that attribute mental illness to the personality of the individual, given its impairments on help-seeking attitudes. Importantly, our study also found that having social contact with individuals with mental illness reduces attribution of personality as a cause of mental illness. As such, it would be beneficial for future anti-stigma interventions or mental health literacy programs to also incorporate social contact with people who have mental illness, in order to challenge misconceptions towards mental illnesses [33]. In view of these considerations, and given that young people are most at risk of developing mental illness[19], there is perhaps a need for mental health literacy to be introduced earlier to youths.

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There were some limitations to our study worth mentioning. Because our study utilized convenience sampling, we had to compare between two broad ethnic groups i.e., Chinese versus non-Chinese, as we did not have enough participants to represent the other major local ethnic groups (Malays and Indians). Hence, we were unable to elucidate the influence that other ethnic cultures may have on causal beliefs and help-seeking. The generalizability of our finding is another limitation. Since we used only the depression vignette in our study, our findings may not necessarily translate to other mental illnesses, and as our sample only comprised University students, our findings might not be indicative of youths in other settings. Lastly, the factor structure for the causal belief scales adopted in this study was generated from an exploratory factor analysis of a previous nationwide study in Singapore, which has yet to be validated in a University population which may have foreign students as well. Nonetheless, this factor structure was used as we believe it to be culturally relevant, given that the factor structure was generated locally, and Singapore happens to be a very small nation; moreover, the non-Singapore resident students constitute only a minority of the sample (n=70).

Notwithstanding these limitations, findings from our study provide some useful insights into the relationship between causal beliefs and help-seeking attitudes amongst young people in University. Future similar research should target young people in other settings, and to examine ethnic differences in causal beliefs and help-seeking behavior. Also, future studies could look into other causal beliefs of mental illness (such as biogenetics and supernatural causes, which were not investigated in this study) and how stigma moderates the relationship between causal beliefs of mental illness and help-seeking attitude.

Findings from our study have several implications. Firstly, the design of interventions to improve help-seeking attitudes amongst University students should consider the receptivity of male

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students, given that they have less positive help-seeking attitudes than their female counterparts.

Secondly, our findings have shown the importance of causal beliefs on help-seeking attitudes. In

order to mitigate the wide treatment gap amongst young people, future anti-stigma interventions

should also focus on addressing the causes of mental illness. Finally, to better ameliorate the

misconceptions regarding the causes of mental illness and correct stereotypes, anti-stigma

interventions should also incorporate contact with an individual who has mental illness, and

mental health literacy should be introduced to youths as early as possible.

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Data sharing statement: Readers who wish to gain access to the data can write to the senior author MS @ mythily@imh.com.sg to request access.

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Appendix A: Vignette

Please read the vignette below and answer the following questions. Indicate your answers by circling the appropriate box

Adam is 30 years old. He has been feeling unusually sad and miserable for the last three weeks. Friends noticed he is no longer his usual cheerful self and he has declined all social gatherings over the past two weeks. Even though he is tired all the time, he has trouble sleeping almost every night. Adam doesn't feel like eating and has lost weight. He can't focus on his work and puts off making decisions. Adam feels worthless and even everyday tasks seem too much for him. This has come to the attention of his boss, who is concerned about Adams's poor work performance.

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

	Item No	Recommendation	Page No
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	2-3
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4-6
Objectives	3	State specific objectives, including any prespecified hypotheses	6
Methods			
Study design	4	Present key elements of study design early in the paper	6-7
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	6-7
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	7
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	N.A
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	7-8
Bias	9	Describe any efforts to address potential sources of bias	7
Study size	10	Explain how the study size was arrived at	N.A
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	9
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	9
		(*b*) Describe any methods used to examine subgroups and interactions	N.A
		(*c*) Explain how missing data were addressed	N.A (Linear regression automatically handles missing data)
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	N.A
		(*e*) Describe any sensitivity analyses	N.A
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	7
		(b) Give reasons for non-participation at each stage	N.A

		(c) Consider use of a flow diagram	N.A
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	10-11
		(b) Indicate number of participants with missing data for each variable of interest	10-12
Outcome data	15*	Report numbers of outcome events or summary measures	11-12
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	9-12
		(*b*) Report category boundaries when continuous variables were categorized	N.A
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N.A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	N.A
Discussion			
Key results	18	Summarise key results with reference to study objectives	13-14
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	18
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	18-19
Generalisability	21	Discuss the generalisability (external validity) of the study results	18
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	22

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Causal Beliefs of Mental Illness and its Impact on Help-seeking Attitudes: A cross-sectional study among university students in Singapore

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Title: Causal Beliefs of Mental Illness and its Impact on Help-seeking Attitudes: A cross-sectional study among university students in Singapore

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Abstract

Objectives: A considerable proportion of those who suffer from mental illnesses in Singapore do not seek any form of professional help. The reluctance to seek professional help could be due to misconceptions about the causes of mental illnesses. Research has shown that help-seeking attitudes can predict actual service use. As young adults are most at risk of developing mental illness, this study aims to elucidate the impact of causal beliefs about mental illness on help-seeking attitudes amongst university students in Singapore.

Design: Prior to attending an anti-stigma intervention, data on the Causal Beliefs about Mental Illness, Inventory of Attitudes towards Seeking Mental Health services, and questions pertaining to sociodemographic background were collected from participants using a self-administered questionnaire. Multiple linear regressions were performed to examine the relationship between causal beliefs and help-seeking, as well as their sociodemographic correlates.

Settings: A university in Singapore

Participants: 390 students who were studying at a Singapore's University at the time of recruitment.

Results: Younger age was associated with higher scores on psychosocial attribution, while prior social contact with individuals with mental illness was significantly associated with lower scores on personality attribution. With regard to help-seeking attitudes; being a male and personality attribution were significantly associated with lower scores on 'Psychological Openness' and 'Indifference to Stigma', while psychosocial attribution was significantly associated with higher scores on 'Help-seeking Propensity'. Having prior social contact also predicted higher

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'Psychological Openness', while being in Year 2 and 3 predicted lower scores on 'Indifference to Stigma'.

Conclusion: Findings from this study suggest that help-seeking attitudes might be influenced by causal beliefs, with personality attribution being the most impairing. Hence, to reduce the wide treatment gap in Singapore, anti-stigma interventions targeting young people could focus on addressing beliefs that attribute mental illness to the personality of the individual.

<u>**Strengths and Limitations**</u>

- A vignette-based approach was adopted to assess causal attributions relating to depression, allows comparison to other studies which also employs vignette-based approach.

- This is the first study to examine the relationship between causal beliefs of mental illness and help-seeking attitudes using a sample of university students in Singapore.

- As only the depression vignette was used for this study, the findings for this study may not be generalizable towards other mental illnesses.

- As convenience sampling was adopted for this study, majority of participants recruited were Chinese and the study team was unable to recruit an adequate number of participants to represent the other major local ethnic groups in Singapore, to better reflect the influence of culture on causal beliefs and help-seeking.

- As the study is voluntary, there may be self-selection bias, as attitudes and knowledge of non-responders may differ from participants, which may not be possible to capture from this study.

INTRODUCTION

Mental illness poses a greater global economic burden than chronic somatic diseases, with an estimated economic cost of US$2.5 trillion worldwide, and this is expected to double by 2030 [1]. Despite the high prevalence of mental disorders and the considerable disease burden caused by it, many individuals with mental illness remain untreated resulting in a treatment gap that is wider than that in any other health sector [1]. Furthermore, untreated mental disorders could result in severe ramifications for the individual. For instance, a person suffering from a single disorder –if not treated in time- may go on to develop more serious symptoms and other complex comorbid conditions that complicate the treatment regimen [2] [3].

Attitudes towards help-seeking, which includes the beliefs and willingness to seek help, have been shown to predict help-seeking behavior [4]. Given the implications of the wide treatment gap for mental disorders, it is important to understand the factors that influence an individual's help-seeking attitudes. Often, the underutilization of mental health services can be due to stigma [5] [6]. Stigma is commonly defined as a denigrating attribute that brings about mark of shame on the carrier [7], which typically leads to stereotype, prejudice and discrimination towards the individual [8]. Stigma may impair an individual's attitudes towards seeking help insomuch that an individual may avoid seeking treatment due to their aversion towards being labelled with a mental illness (label avoidance) and its negative consequences, such as becoming ostracized or discriminated at work [9]. Other factors that may influence help-seeking attitudes include the perceived need for seeking treatment from professionals as well as the perceived helpfulness of the treatment [10] [11].

The causal beliefs of mental illness are another potential factor leading to stigma and the reluctance to seek help [12] [13]. Importantly, an individual's treatment preferences may be influenced by the causal beliefs about their symptoms, which may in turn lead them to seek help

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from inappropriate sources or even refraining from seeking help altogether [14] [15]. For instance, individuals attributing symptoms of mental illness to supernatural causes are less likely to view professional mental health services as effective, and are more likely to seek culturally traditional or religious forms of healing [16]. A study by Bhikha et al. (2005) suggests that lay beliefs about the causes of mental illness informs help-seeking choices; where the majority of participants who endorsed a dual explanatory model (both supernatural and biological causes) for psychosis took both the prescribed medication and followed the treatment prescribed by a faith healer [17].

Rickwood et al. (2005) proposed a model for the process of help-seeking for mental health problems amongst young people. According to this model, help-seeking begins with an individual's awareness or appraisal of problems before expression of one's symptoms and needs to others, and finally the willingness to seek help from available sources [18]. Based on this model and the literature on the relationship between causal beliefs and help-seeking behaviors [11] [14-16], a hypothesis can be formulated, namely; etiological beliefs of mental illness are probable determinants of help-seeking attitudes and intentions. Moreover, different causal attributions are likely to influence help-seeking behaviors and coping strategies towards mental illness differentially. Reducing the treatment gap, therefore, entails understanding and addressing the causal beliefs of mental illness in the context appropriate to the targeted audience.

The Singapore Mental Health Study conducted in 2016 found that the lifetime prevalence for mental disorders was 13.9%. Depression was found to be the most prevalent condition in this study, and youths emerged as the most vulnerable group for both lifetime and 12-month prevalence[19]. The phenomenon of treatment gap is particularly relevant to Singapore, as the 12-month treatment gap for several mental illnesses in Singapore is high (78.6%). Importantly, it has also been reported that those with higher education in Singapore are less likely to seek help

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[20]. Since attitudes towards help-seeking predict actual service use [21], such findings highlight a need to understand the factors that affect help-seeking amongst young people with higher education in Singapore.

Previous studies in Singapore have investigated causal beliefs of mental illness where it was reported that psychosocial causes were the most likely to be attributed to mental disorders, followed by personality and physical causes [22 23]. However, these studies did not specifically sample young adults or investigate the relationship between causal beliefs and help-seeking attitudes. Research has shown that both causal beliefs and help-seeking attitudes can vary according to cultural and socio-demographic differences [14 16 22-25]. As depression is the most prevalent condition among the 18-34 age group in Singapore, understanding the causal beliefs of university students could be vital in reducing the treatment gap in this population.

In view of such findings, this study aims to examine the relationship between the causal beliefs about depression and help-seeking attitudes amongst university students in Singapore, taking into account their socio-demographic correlates.

2. METHODS

2.1 Participants and Procedures

This study employed a convenience sampling method. Data were collected from a total of 390 students in a university in Singapore, as part of a larger study called Advancing Research to Eliminate Mental Illness Stigma (ARTEMIS), which evaluated the effectiveness of an anti-stigma intervention. The ARTEMIS is an interventional study with repeated measures, and a total of 390 participants were recruited at baseline. Participants were first made to fill up a set of self-administered questionnaires prior to attending the intervention, to establish scores on

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baseline. After the intervention, the same 390 participants were then made to fill up another set of similar questionnaires, to allow evaluation of the intervention's efficacy. There was no attrition between baseline and post-intervention. To assess the lasting impacts of the intervention, participants were asked to complete a similar set of questionnaires three months from the date of intervention.

However, as the aim of this paper is purely to examine the relationship between causal beliefs of mental illness and help-seeking attitudes among Singapore's university students, only socio-demographic information and baseline data of the 390 participants from ARTEMIS collected prior to the intervention were used for the analysis in this study.

Participants for this study were recruited via an e-mail invitation that sent to students of various faculties within the University. Inclusion criteria were: 1) age between 18 to 35 years; 2) provision of informed consent, including parental consent for those below 21 as the age of majority in Singapore is 21 years; and 3) literacy in the English language. After providing written informed consent, participants were asked to fill up a series of self-administered questionnaires. The questionnaires were self-administered to minimize the effect of social desirability bias. The self-administered questionnaires included the Causal Beliefs about Mental Illness and the Inventory of Attitudes towards Seeking Mental Health Services (IASMHS). Socio-demographic information of the respondents was also captured using a short questionnaire. The study was approved by the relevant institutional ethics committee, the Domain Specific Review Board of National Healthcare Group in Singapore.

2.2 Instruments

Causal beliefs about mental illness

The scale used in this study to assess causal beliefs about mental illness was originally developed

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by Reavley and Jorm [12][23]. It comprises ten items describing the plausible causes of the problem depicted using a vignette approach. Participants had to first read the vignette which described an adult man with symptoms of depression (see Appendix A for more information on vignette) before responding to the items in the scale. Due to its cultural relevance, Pang et al's (2018) adaptation of the causal beliefs scale was used in this study. A 3-factor model was proposed for Pang et al's (2018) adapted scale, and the factors were 'Physical', 'Personality' and 'Psychosocial'. Items that loaded on the 'Physical' factor comprised 'virus or infection' and 'allergy or reaction', while the 'Personality' factor consisted of 'being a nervous person' and 'having a weak character', and the 'Psychosocial' factor encompassed 'everyday problems such as stress, family arguments, difficulties at work or financial difficulties', 'recent death of a close friend or family', 'recent traumatic event such as a severe traffic accident' and 'childhood problems such as being badly treated or abused, losing one or both parents when young or coming from a broken home'.

Inventory of Attitudes Towards Seeking Mental Health Services

The Inventory of Attitudes Towards Seeking Mental Health Services (IASMHS) is a 24-items scale designed to measure an individual's attitudes towards seeking professional help for psychological issues and has been validated for use in a student population (IASMHS)[26]. Participants were asked to rate how much they agree or disagree with each of the items on a 5-point Likert scale ranging from 'disagree' to 'agree'. The original developer of the IASMHS identified a 3-factor structure for the scale, namely 'Psychological Openness' (the degree of an individual's openness to acknowledging one's own psychological problems and to seek professional help for it), 'Help-seeking propensity' (the extent of one's willingness as well as perceived ability to seek professional psychological help) and 'Indifference to stigma' (how

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concerned an individual will be about others discovering them seeking professional help for their problems). Higher scores on a factor signify a more positive opinion towards that particular dimension of help-seeking attitude. This 3-factor model of the IASMHS has also been validated recently by 2 other studies which employed different samples [27] [28], suggesting that this factor-structure is rather robust.

2.3 Analysis

All analyses for this study were performed using SPSS version 23. Participants' responses to the items on the causal beliefs scale were ranked and coded such that 'very likely' = 5, 'likely' = 4, 'depends' = 3, 'unlikely' = 2, and 'very unlikely' = 1, while 'I don't know' responses were treated as missing data. Scores for each factor of the causal beliefs scale were derived by summing up the scores of items in each factor and dividing it by the number of items loaded on each respective factor. Higher scores on a factor represent stronger attribution to the factor as the cause of mental illness. Responses to the items in the IASMHS scale were also ranked and coded such that 'disagree' = 0, 'somewhat disagree' = 1, 'undecided' = 2, 'somewhat agree' = 3, and 'agree' = 4. Scores for each factor in the IASMHS scale were generated by summing up the scores of items in each factor.

To understand the effects of sociodemographic characteristics on the causal attribution of mental illness, three multivariate linear regression models were run separately using each of the causal belief factors as dependent variables, while sociodemographic variables such as age, gender, ethnicity and year of study, were treated as independent variables. Other independent variables comprise social contact with a person(s) with mental illness such as having a close friend or family with mental illness and past experience in the mental health field. In order to elucidate the impact of causal attributions on help-seeking attitudes, three multivariate linear regression

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models were performed using each of the IASMHS factors as the dependent variable, while the aforementioned variables with the addition of causal beliefs factors were treated as independent variables. Data were analyzed with the Statistical Package for Social Sciences V.23.0 (SPSS) and all statistically significant results are reported at $p < 0.05$.

2.4 Patient and Public Involvement

This research was done without patient involvement. No patients were involved in the planning or design of this study, nor consulted to develop patient relevant outcomes or interpret the results. No patients were invited to contribute to the writing or editing of this document for readability or accuracy.

3. RESULTS

3.1 Descriptive Analysis

The demographic characteristics of our participants are shown in Table 1. The majority of participants were female (60.3%) and of Chinese ethnicity (82.8%). The mean (±SD) age of the participants was $22.8 ± 2.2$ years. In terms of years of study in the university, 33.3% were in Year 1, 24.9% in Year 2, 20.3% in Year 3 and 21.5% were in Year 4. 42.6% of participants knew of at least one close friend or family member who has a mental illness, and 22.2% had past experience within the mental health field. 0.5% (n=2) had missing data for the variable past experience within the mental health field.

Table 1: Sociodemographic characteristics of participants. (n = 390)

		Mean	SD
Age		22.2	2.2
		N	%
Gender			
	Male	155	39.7

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	Female	235	60.3
Ethnicity			
	Chinese	323	82.8
	Non-Chinese	67	17.2
Year of Study			
	Year 1	130	33.3
	Year 2	97	24.9
	Year 3	79	20.3
	Year 4	84	21.5
Close friend or family member who has a mental illness			
	Yes	166	42.6
	No	224	57.4
Past experience within mental health field			
	Yes	86	22.2
	No	301	77.8

3.2 Descriptive Statistics on Causal Beliefs of Depression

Table 2 lists the mean score of each causal attribution of depression. The mean score for the 3 factors of causal beliefs were 1.8 ± 0.8 for physical attribution (3.1% had missing data, n=12), 4.2 ± 0.5 for psychosocial attribution (2.3% had missing data, n=9) and 3.1 ± 1.0 for personality attribution (7.7% had missing data, n=30).

Table 2: Descriptive statistics on the Causal Beliefs of Depression

	Physical	Psychosocial	Personality
Mean (SD)	1.8 (0.8)	4.2 (0.5)	3.1 (1.0)
Range	1.0 - 4.5	2.0 - 5.0	1.0 - 5.0

3.3 Multivariate Linear Regressions of Casual Beliefs Factors and Help-seeking Attitudes

Results from multivariate linear regressions found no significant socio-demographic predictors for physical attribution of mental illness (Table 3). On the other hand, younger age significantly predicted higher psychosocial attribution, while having close family or friends with mental

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illness or past experience in the mental health scene were both negatively associated with personality attribution.

Table 3: Sociodemographic Correlates of 3 Causal Belief Factors

	Physical			Psychosocial			Personality		
	B	95% CI	p-value	β	95% CI	p-value	β	95% CI	p-value
Age	-0.018	-0.065 to 0.029	0.457	-0.035	-0.067 to -0.004	**0.029***	0.009	-0.048 to 0.065	0.757
Gender									
Male (Ref)									
Female	-0.041	-0.240 to 0.159	0.689	0.030	-0.104 to 0.163	0.665	0.149	-0.089 to 0.387	0.218
Ethnicity									
Chinese (Ref)									
Non-Chinese	0.086	-0.147 to 0.319	0.467	0.108	-0.045 to 0.261	0.167	0.250	-0.029 to 0.530	0.079
Years of Study									
Year 1 (Ref)									
Year 2	-0.223	-0.458 to 0.012	0.063	-0.034	-0.193 to 0.124	0.671	-0.145	-0.425 to 0.135	0.309
Year 3	-0.170	-0.430 to 0.089	0.198	-0.075	-0.249 to 0.099	0.397	-0.076	-0.384 to 0.231	0.626
Year 4	-0.073	-0.345 to 0.198	0.596	0.033	-0.150 to 0.215	0.726	-0.068	-0.390 to 0.254	0.677
Close friend or family with MI									
Yes	-0.170	-0.350 to 0.010	0.065	0.074	-0.047 to 0.194	0.231	-0.229	-0.444 to -0.015	**0.036***
No (Ref)									
Past Experience in mental health field									
Yes	0.052	-0.161 to 0.265	0.632	0.110	-0.033 to 0.253	0.130	-0.297	-0.551 to -0.044	**0.021***
No (Ref)									

* denotes significant association at p-value <0.05

With regards to help-seeking attitudes, multivariate linear regressions identified stronger psychosocial attribution to be associated with higher 'Help-seeking Propensity' whereas stronger personality attribution was linked to lower 'Psychological Openness' and 'Indifference to Stigma' (refer to Table 4). In addition, being a male was significantly associated with poorer scores on 'Psychological Openness' and 'Indifference to Stigma', while participant's year of study and 'Indifference to Stigma' scores had an inverse relationship. Lastly, past experience in mental health field was significantly associated with both 'Psychological Openness' and 'Help-seeking Propensity' while having a close friend/relative with mental illness was only

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significantly associated with 'Psychological Openness'. (refer to Table 4). 0.5%(n=2) of

participants had missing data for 'Psychological Openness' factor, 0.3%(n=1) for 'Help-seeking

Propensity', and 1.0%(n=4) for 'Indifference to Stigma'.

Table 4: Multivariate Regression for Help-seeking Attitudes

	Psychological Openness				Help-seeking Propensity				Indifference to Stigma	
	β	95% CI	p-value	β	95% CI	p-value	β	95% CI	p-value
Age	0.190	-0.081 to 0.461	0.168	0.250	-0.021 to 0.520	0.070	0.236	-0.131 to 0.604	0.206
Gender									
Male (Ref)									
Female	2.310	1.163 to 3.458	**<0.001****	-0.759	-1.904 to 0.385	0.193	1.573	0.014 to 3.131	**0.048***
Ethnicity									
Chinese (Ref)									
Non-Chinese	-0.294	-1.681 to 1.093	0.677	1.343	-0.040 to 2.725	0.057	1.487	-0.404 to 3.378	0.123
Years of Study									
Year 1 (Ref)									
Year 2	0.225	-1.136 to 1.585	0.745	0.569	-0.787 to 1.925	0.410	-1.854	-3.696 to -0.011	**0.049***
Year 3	-0.552	-2.041 to 0.938	0.467	-0135	-1.620 to 1.351	0.859	-3.091	-5.119 to -1.064	**0.003****
Year 4	0.089	-1.470 to 1.647	0.911	0.773	-0.781 to 2.326	0.329	-1.969	-4.090 to 0.153	0.069
Close friend or family with MI									
Yes	2.532	1.479 to 3.585	**<0.001****	0.142	-0.908 to 1.192	0.791	0.949	-0.483 to 2.380	0.193
No (Ref)									
Past Experience in mental health field									
Yes	20.70	0.829 to 3.310	**0.001****	1.602	0.365 to 2.839	**0.011***	0.463	-1.219 to 2.146	0.588
No (Ref)									
Causal Beliefs									
Physical	-0.301	-0.897 to 0.295	0.321	0.086	-0.508 to 0.681	0.776	-0.640	-1.449 to 0.170	0.121
Psychosocial	-0.083	-0.965 to 0.799	0.853	1.252	0.373 to 2.132	**0.005****	-0.045	-1.242 to 1.152	0.941
Personality	-1.133	-1.650 to -0.616	**<0.001****	0.002	-0.513 to 0.518	0.993	-0.711	-1.417 to -0.005	**0.048***

* denotes significant association at *p-value* <0.05
** denotes significant association at *p-value* <0.01

4. DISCUSSION

Consistent with the findings of the study by Pang et al. (2018), physical causes (μ =1.86 ± 0.85)

was the least endorsed attribution of depression amongst our participants, followed by

personality causes (μ =3.18 ± 1.00) and psychosocial causes (μ = 4.25 ± 0.57). Pang et al. (2018)

also found age differences in psychosocial beliefs, with older adults (35-49 years) being less

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likely than younger adults (18-34 years) to endorse psychosocial beliefs. Several studies have reported that endorsement of psychosocial causes of depression such as negative life events, broken homes, and lack of parental affection, reduces stigma and the desire for social distance [29-31]. Since causal attributions are linked to stigma [9 12] and younger adults tend to show less stigma towards mental illness [30 32], this possibly explains the age differences in psychosocial beliefs observed in our study. Taking into consideration the narrow age range of our participants, the age differences found in our study perhaps reflect the improvements of awareness initiatives that were integrated within educational settings over the years.

With regards to help-seeking attitudes, our multiple linear regression analysis found several significant associations between subscales of IASMHS and socio-demographic factors, as well as between subscales of IASMHS and causal attribution of mental illness.

Having a close friend/family member with mental illness and past experience in the mental health field were both associated with lower scores on personality attribution, and this could be due to the effects of social contact with individuals who have mental illness. Intergroup contact has been suggested to improve mental health literacy, increase empathy and reduce stigma [33].Hence, this finding may be tied to participants having a better understanding about the multifactorial causes of depression, and knowing that it is unlikely to be caused by just a 'weak or nervous personality'.

Interestingly, having a close friend/family with mental illness and past experience in the mental health field were also significantly correlated to "Psychological Openness" scores, but only past experience in mental health field was significantly correlated to "Help-seeking Propensity" scores. A plausible explanation would be that intergroup contact helped to reduce stigma and thus promoted participant's willingness to acknowledge their psychological challenges and be

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open about it. However, "Help-seeking Propensity' measures participant's knowledge of where to seek help and their perceived capability/willingness to do so. In which case, intergroup contact with just friends/family with mental illness may not necessarily enhance their 'Help-seeking Propensity'. On the other hand, having past experience in the mental health field would arguably improve their mental health literacy, thereby positively influencing their knowledge of where and when to seek help, as well as the perceived helpfulness of doing so. Nonetheless, further research may be needed to explore this phenomenon of how different forms of social contact affect help-seeking differentially.

Consistent with the extant literature, our study found a gender bias in help-seeking attitudes [25][34][35], with females scoring significantly higher in "Psychological Openness" and "Indifference to Stigma" than their male counterparts. The gender differences in our findings might be due to cultural ideologies of masculinity [36] where admitting that one has a mental health problem is akin to revealing one's weaknesses, and this is compounded by the perception that people who seek psychological treatment are often stereotyped as "weak"[9]. This possibly explains why males in the study were less open to acknowledging their psychological problems if any, and at the same time more apprehensive about others finding out should they seek treatment.

Our analysis also showed that attributing the cause of depression to an individual's personality was associated with lower "Psychological Openness" and "Indifference to Stigma". This negative association between personality attribution and the two aforementioned help-seeking factors could be related to stigma. A study by Reavley and Jorm (2014) established that the belief in personality being a cause of mental illnesses is associated with higher personal *weak not sick* stigma [12]. As such, attributing the cause of mental illness to a 'weak or nervous' personality is likely to engender denial towards one's condition, for it implies that mental illness is within a

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person's control (*weak*) and not a genuine medical issue (*not sick*) [22] [37]. This could results in self-blame and feelings of shame, which consequently leads to greater self-stigma and difficulty in acknowledging one's mental health problems [38-40], as well as greater consternation about others knowing should they seek treatment.

Personality attribution may also exacerbate the denial of one's condition especially in Asian cultures where having a mental illness is commonly seen as a disgrace to the family. A case in point would be the Chinese culture, where a mental illness is seen as a mark of shame that "tarnishes family honour, name and ancestors" [41]. In this case, personality attribution is likely to invoke feelings of blame and guilt on the sufferer for being unable to 'endure' one's problem, consequently fostering a strong antipathy towards acknowledging one's condition. Further, the belief that one can handle their symptoms on their own has been found to affect help-seeking intentions [10] [18] [42]. As such, the belief that mental illness is due to a "weak or nervous" personality might inhibit an individual's openness to the idea of seeking help, especially so in cultures where seeking treatment is viewed as "a lack of endurance, personality strength and dignity" [41]. Conceivably, in such scenarios, individuals would face greater inertia in confronting their psychological issues (lower "Psychological Openness"), and also perceive greater stigma in seeking treatment (lower "Indifference to Stigma").

In contrast, higher "Help-seeking Propensity" scores were linked to greater endorsement of psychosocial attribution. The perceived need for psychological treatment from professionals and the perceived helpfulness of doing so has been shown to influence help-seeking attitudes [10] [11] with individuals who endorsed psychosocial attributions being more likely to regard it as a treatable condition [43], and are therefore more willing to seek treatment. An alternative explanation could be linked to how psychosocial causes (i.e. childhood maltreatment and trauma)

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alludes to external factors that are beyond an individual's control. It has been shown that attribution of mental illness to external factors is positively associated with help-seeking [44], possibly because it evokes less self-afflicted blame and guilt within the individual. Furthermore, as mentioned above, several studies have reported that endorsement of psychosocial causes of depression reduces stigma and desire for social distance [29-31]. Based on these findings, it can be postulated that when mental illness is attributed to psychosocial causes, individuals may be more willing to seek help as they perceive less stigma associated with the illness.

Another interesting finding is that as university students progress in their year of study in the school, their scores on "Indifference to Stigma" tend to decrease. A possible explanation could be due to the fear of being labelled which in turn may lead to others regarding them as less competent [9] [45]. Thus, students may worry about their peers finding out that they are seeking treatment and thereby perceive them as weak or burdensome individuals who are unable to contribute sufficiently in projects/assignments. Alternatively, it may be that as students gradually progress in University, they tend to have larger social networks in school. Hence, there would be greater concern about others finding out that they are seeking treatment because of the stigma associated with the label [45] and the fear of losing their social standing in school.

Similar findings in terms of the association between causal attribution of mental illnesses and help-seeking attitudes have been reported in previous studies [14] [46]. Chen and Mak's (2008) study, which also comprised undergraduate students, reported that help-seeking likelihood was positively correlated to attribution of mental illness to environmental/hereditary causes and negatively correlated to social-personal causes [14]. This corroborates our study's finding that help-seeking attitudes are more likely to be unfavorable when the etiological cause of mental illness is attributed to person-related reasons, whereas attributing mental illness to psychosocial reasons,

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likely encourages help-seeking. However, another study that investigated the relationship between causal beliefs of mental illness and help-seeking attitudes among a sample of persons with untreated depressive syndromes had slightly dissimilar results [46]. The study found that lower attribution to person-related causes was linked to greater perceived need for help among participants with prior treatment experience. In contrast, attribution to biomedical causes was related to greater perceived need and stronger help-seeking intentions among participants without prior treatment experience. On the contrary, attributions to childhood trauma or stress - which were more related to our psychosocial factor- were not significantly associated with help-seeking in this study. A juxtapose of these two previous studies with the current one hence suggests that attribution of mental illness to person-related causes may have quite a universal impact on help-seeking, whereas the same may not be said for psychosocial causes.

Several studies which had also utilized the IASMHS demonstrated "Help-seeking Propensity" to be the greatest factor out of the three to predict mental health service use [27 28 35]. Notably, it is recommended for future interventions targeting university students to emphasize more on psychosocial causes of mental illness, while addressing the beliefs that attribute mental illness to the personality of the individual, given its impairments on help-seeking attitudes. Importantly, our study also found that having social contact with individuals with mental illness reduces attribution of personality as a cause of mental illness. As such, it would be beneficial for future anti-stigma interventions or mental health literacy programs to also incorporate social contact with people who have mental illness, in order to challenge misconceptions towards mental illnesses [33]. In view of these considerations, and given that young people are most at risk of developing mental illness[19], there is perhaps a need for mental health literacy to be introduced earlier to youths.

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There were some limitations to our study worth mentioning. Because our study utilized convenience sampling, we had to compare between two broad ethnic groups i.e., Chinese versus non-Chinese, as we did not have enough participants to represent the other major local ethnic groups (Malays and Indians). Hence, we were unable to elucidate the influence that other ethnic cultures may have on causal beliefs and help-seeking. The generalizability of our finding is another limitation. Since we used only the depression vignette in our study, our findings may not necessarily translate to other mental illnesses, and as our sample only comprised University students, our findings might not be indicative of youths in other settings. Lastly, the factor structure for the causal belief scales adopted in this study was generated from an exploratory factor analysis of a previous nationwide study in Singapore, which has yet to be validated in a University population which may have foreign students as well. Nonetheless, this factor structure was used as we believe it to be culturally relevant, given that the factor structure was generated locally, and Singapore happens to be a very small nation; moreover, the non-Singapore resident students constitute only a minority of the sample (n=70).

Notwithstanding these limitations, findings from our study provide some useful insights into the relationship between causal beliefs and help-seeking attitudes amongst young people in University. Future similar research should target young people in other settings, and to examine ethnic differences in causal beliefs and help-seeking behavior. Also, future studies could look into other causal beliefs of mental illness (such as biogenetics and supernatural causes, which were not investigated in this study) and how stigma moderates the relationship between causal beliefs of mental illness and help-seeking attitude.

Findings from our study have several implications. Firstly, the design of interventions to improve help-seeking attitudes amongst University students should consider the receptivity of male

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students, given that they have less positive help-seeking attitudes than their female counterparts.

Secondly, our findings have shown the importance of causal beliefs on help-seeking attitudes. In

order to mitigate the wide treatment gap amongst young people, future anti-stigma interventions

should also focus on addressing the causes of mental illness. Finally, to better ameliorate the

misconceptions regarding the causes of mental illness and correct stereotypes, anti-stigma

interventions should also incorporate contact with an individual who has mental illness, and

mental health literacy should be introduced to youths as early as possible.

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Appendix A: Vignette

Please read the vignette below and answer the following questions. Indicate your answers by circling the appropriate box

Adam is 30 years old. He has been feeling unusually sad and miserable for the last three weeks. Friends noticed he is no longer his usual cheerful self and he has declined all social gatherings over the past two weeks. Even though he is tired all the time, he has trouble sleeping almost every night. Adam doesn't feel like eating and has lost weight. He can't focus on his work and puts off making decisions. Adam feels worthless and even everyday tasks seem too much for him. This has come to the attention of his boss, who is concerned about Adams's poor work performance.

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

	Item No	Recommendation	Page No
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	2-3
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4-6
Objectives	3	State specific objectives, including any prespecified hypotheses	6
Methods			
Study design	4	Present key elements of study design early in the paper	6-7
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	6-7
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	7
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	N.A
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	7-8
Bias	9	Describe any efforts to address potential sources of bias	7
Study size	10	Explain how the study size was arrived at	N.A
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	9
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	9
		(*b*) Describe any methods used to examine subgroups and interactions	N.A
		(*c*) Explain how missing data were addressed	N.A (Linear regression automatically handles missing data)
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	N.A
		(*e*) Describe any sensitivity analyses	N.A
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	7
		(b) Give reasons for non-participation at each stage	N.A

		(c) Consider use of a flow diagram	N.A
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	10-11
		(b) Indicate number of participants with missing data for each variable of interest	10-12
Outcome data	15*	Report numbers of outcome events or summary measures	11-12
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	9-12
		(*b*) Report category boundaries when continuous variables were categorized	N.A
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N.A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	N.A
Discussion			
Key results	18	Summarise key results with reference to study objectives	13-14
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	18
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	18-19
Generalisability	21	Discuss the generalisability (external validity) of the study results	18
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	22

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Causal Beliefs of Mental Illness and its Impact on Help-seeking Attitudes: A cross-sectional study among university students in Singapore

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Title: Causal Beliefs of Mental Illness and its Impact on Help-seeking Attitudes: A cross-sectional study among university students in Singapore

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Abstract

Objectives: A considerable proportion of those who suffer from mental illnesses in Singapore do not seek any form of professional help. The reluctance to seek professional help could be due to misconceptions about the causes of mental illnesses. Research has shown that help-seeking attitudes can predict actual service use. As young adults are most at risk of developing mental illness, this study aims to elucidate the impact of causal beliefs about mental illness on help-seeking attitudes amongst university students in Singapore.

Design: Prior to attending an anti-stigma intervention, data on the Causal Beliefs about Mental Illness, Inventory of Attitudes towards Seeking Mental Health services, and questions pertaining to sociodemographic background were collected from participants using a self-administered questionnaire. Multiple linear regressions were performed to examine the relationship between causal beliefs and help-seeking, as well as their sociodemographic correlates.

Settings: A university in Singapore

Participants: 390 students who were studying at a Singapore's University at the time of recruitment.

Results: Younger age was associated with higher scores on psychosocial attribution, while prior social contact with individuals with mental illness was significantly associated with lower scores on personality attribution. With regard to help-seeking attitudes; being a male and personality attribution were significantly associated with lower scores on 'Psychological Openness' and 'Indifference to Stigma', while psychosocial attribution was significantly associated with higher scores on 'Help-seeking Propensity'. Having prior social contact also predicted higher

'Psychological Openness', while being in Year 2 and 3 predicted lower scores on 'Indifference to Stigma'.

Conclusion: Findings from this study suggest that help-seeking attitudes might be influenced by causal beliefs, with personality attribution being the most impairing. Hence, to reduce the wide treatment gap in Singapore, anti-stigma interventions targeting young people could focus on addressing beliefs that attribute mental illness to the personality of the individual.

<u>Strengths and Limitations</u>

- A vignette-based approach was adopted to assess causal attributions relating to depression, allows comparison to other studies which also employs vignette-based approach.

- This is the first study to examine the relationship between causal beliefs of mental illness and help-seeking attitudes using a sample of university students in Singapore.

- As only the depression vignette was used for this study, the findings for this study may not be generalizable towards other mental illnesses.

- As convenience sampling was adopted for this study, majority of participants recruited were Chinese and the study team was unable to recruit an adequate number of participants to represent the other major local ethnic groups in Singapore, to better reflect the influence of culture on causal beliefs and help-seeking.

- As the study is voluntary, there may be self-selection bias, as attitudes and knowledge of non-responders may differ from participants, which may not be possible to capture from this study.

INTRODUCTION

Mental illness poses a greater global economic burden than chronic somatic diseases, with an estimated economic cost of US$2.5 trillion worldwide, and this is expected to double by 2030 [1]. Despite the high prevalence of mental disorders and the considerable disease burden caused by it, many individuals with mental illness remain untreated resulting in a treatment gap that is wider than that in any other health sector [1]. Furthermore, untreated mental disorders could result in severe ramifications for the individual. For instance, a person suffering from a single disorder –if not treated in time- may go on to develop more serious symptoms and other complex comorbid conditions that complicate the treatment regimen [2][3].

Attitudes towards help-seeking, which includes the beliefs and willingness to seek help, have been shown to predict help-seeking behavior [4]. Given the implications of the wide treatment gap for mental disorders, it is important to understand the factors that influence an individual's help-seeking attitudes. Often, the underutilization of mental health services can be due to stigma [5][6]. Stigma is commonly defined as a denigrating attribute that brings about mark of shame on the carrier [7], which typically leads to stereotype, prejudice and discrimination towards the individual [8]. Stigma may impair an individual's attitudes towards seeking help insomuch that an individual may avoid seeking treatment due to their aversion towards being labelled with a mental illness (label avoidance) and its negative consequences, such as becoming ostracized or discriminated at work [9]. Other factors that may influence help-seeking attitudes include the perceived need for seeking treatment from professionals as well as the perceived helpfulness of the treatment [10][11].

The causal beliefs of mental illness are another potential factor leading to stigma and the reluctance to seek help [12][13]. Importantly, an individual's treatment preferences may be influenced by the causal beliefs about their symptoms, which may in turn lead them to seek help

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from inappropriate sources or even refraining from seeking help altogether [14] [15]. For instance, individuals attributing symptoms of mental illness to supernatural causes are less likely to view professional mental health services as effective, and are more likely to seek culturally traditional or religious forms of healing [16]. A study by Bhikha et al. (2005) suggests that lay beliefs about the causes of mental illness informs help-seeking choices; where the majority of participants who endorsed a dual explanatory model (both supernatural and biological causes) for psychosis took both the prescribed medication and followed the treatment prescribed by a faith healer [17].

Rickwood et al. (2005) proposed a model for the process of help-seeking for mental health problems amongst young people. According to this model, help-seeking begins with an individual's awareness or appraisal of problems before expression of one's symptoms and needs to others, and finally the willingness to seek help from available sources [18]. Based on this model and the literature on the relationship between causal beliefs and help-seeking behaviors [11] [14-16], a hypothesis can be formulated, namely; etiological beliefs of mental illness are probable determinants of help-seeking attitudes and intentions. Moreover, different causal attributions are likely to influence help-seeking behaviors and coping strategies towards mental illness differentially. Reducing the treatment gap, therefore, entails understanding and addressing the causal beliefs of mental illness in the context appropriate to the targeted audience.

The Singapore Mental Health Study conducted in 2016 found that the lifetime prevalence for mental disorders was 13.9%. Depression was found to be the most prevalent condition in this study, and youths emerged as the most vulnerable group for both lifetime and 12-month prevalence[19]. The phenomenon of treatment gap is particularly relevant to Singapore, as the 12-month treatment gap for several mental illnesses in Singapore is high (78.6%). Importantly, it has also been reported that those with higher education in Singapore are less likely to seek help

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[20]. Since attitudes towards help-seeking predict actual service use [21], such findings highlight a need to understand the factors that affect help-seeking amongst young people with higher education in Singapore.

Previous studies in Singapore have investigated causal beliefs of mental illness where it was reported that psychosocial causes were the most likely to be attributed to mental disorders, followed by personality and physical causes [22 23]. However, these studies did not specifically sample young adults or investigate the relationship between causal beliefs and help-seeking attitudes. Research has shown that both causal beliefs and help-seeking attitudes can vary according to cultural and socio-demographic differences [14 16 22-25]. As depression is the most prevalent condition among the 18-34 age group in Singapore, understanding the causal beliefs of university students could be vital in reducing the treatment gap in this population.

In view of such findings, this study aims to examine the relationship between the causal beliefs about depression and help-seeking attitudes amongst university students in Singapore, taking into account their socio-demographic correlates.

2. METHODS

2.1 Participants and Procedures

This study employed a convenience sampling method. Data for this study comprises the entire baseline data (n = 390) of the Advancing Research to Eliminate Mental Illness Stigma (ARTEMIS) study, which evaluated the effectiveness of an anti-stigma intervention. The ARTEMIS is an interventional study with repeated measures, and a total of 390 participants were recruited at baseline. Participants were first made to fill up a set of self-administered questionnaires prior to attending the intervention, to establish scores on baseline. After the

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intervention, the same 390 participants were then made to fill up another set of similar questionnaires, to allow evaluation of the intervention's efficacy. There was no attrition between baseline and post-intervention. To assess the lasting impacts of the intervention, participants were asked to complete a similar set of questionnaires three months from the date of intervention.

As the aim of this paper is purely to examine the relationship between causal beliefs of mental illness and help-seeking attitudes among Singapore's university students, only socio-demographic information and baseline data of all 390 participants from ARTEMIS collected prior to the intervention were used for the analysis in this study.

Participants for this study were recruited via an e-mail invitation that sent to students of various faculties within the University. Inclusion criteria were: 1) age between 18 to 35 years; 2) provision of informed consent, including parental consent for those below 21 as the age of majority in Singapore is 21 years; and 3) literacy in the English language. After providing written informed consent, participants were asked to fill up a series of self-administered questionnaires. The questionnaires were self-administered to minimize the effect of social desirability bias. The self-administered questionnaires included the Causal Beliefs about Mental Illness and the Inventory of Attitudes towards Seeking Mental Health Services (IASMHS). Socio-demographic information of the respondents was also captured using a short questionnaire. The study was approved by the relevant institutional ethics committee, the Domain Specific Review Board of National Healthcare Group in Singapore.

2.2 Instruments

Causal beliefs about mental illness

The scale used in this study to assess causal beliefs about mental illness was originally developed

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by Reavley and Jorm [12 23]. It comprises ten items describing the plausible causes of the problem depicted using a vignette approach. Participants had to first read the vignette which described an adult man with symptoms of depression (see Appendix A for more information on vignette) before responding to the items in the scale. Due to its cultural relevance, Pang et al's (2018) adaptation of the causal beliefs scale was used in this study. A 3-factor model was proposed for Pang et al's (2018) adapted scale, and the factors were 'Physical', 'Personality' and 'Psychosocial'. Items that loaded on the 'Physical' factor comprised 'virus or infection' and 'allergy or reaction', while the 'Personality' factor consisted of 'being a nervous person' and 'having a weak character', and the 'Psychosocial' factor encompassed 'everyday problems such as stress, family arguments, difficulties at work or financial difficulties', 'recent death of a close friend or family', 'recent traumatic event such as a severe traffic accident' and 'childhood problems such as being badly treated or abused, losing one or both parents when young or coming from a broken home'.

Inventory of Attitudes Towards Seeking Mental Health Services

The Inventory of Attitudes Towards Seeking Mental Health Services (IASMHS) is a 24-items scale designed to measure an individual's attitudes towards seeking professional help for psychological issues and has been validated for use in a student population (IASMHS)[26]. Participants were asked to rate how much they agree or disagree with each of the items on a 5-point Likert scale ranging from 'disagree' to 'agree'. The original developer of the IASMHS identified a 3-factor structure for the scale, namely 'Psychological Openness' (the degree of an individual's openness to acknowledging one's own psychological problems and to seek professional help for it), 'Help-seeking propensity' (the extent of one's willingness as well as perceived ability to seek professional psychological help) and 'Indifference to stigma' (how

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concerned an individual will be about others discovering them seeking professional help for their problems). Higher scores on a factor signify a more positive opinion towards that particular dimension of help-seeking attitude. This 3-factor model of the IASMHS has also been validated recently by 2 other studies which employed different samples [27] [28], suggesting that this factor-structure is rather robust.

2.3 Analysis

All analyses for this study were performed using SPSS version 23. Participants' responses to the items on the causal beliefs scale were ranked and coded such that 'very likely' = 5, 'likely' = 4, 'depends' = 3, 'unlikely' = 2, and 'very unlikely' = 1, while 'I don't know' responses were treated as missing data. Scores for each factor of the causal beliefs scale were derived by summing up the scores of items in each factor and dividing it by the number of items loaded on each respective factor. Higher scores on a factor represent stronger attribution to the factor as the cause of mental illness. Responses to the items in the IASMHS scale were also ranked and coded such that 'disagree' = 0, 'somewhat disagree' = 1, 'undecided' = 2, 'somewhat agree' = 3, and 'agree' = 4. Scores for each factor in the IASMHS scale were generated by summing up the scores of items in each factor.

To understand the effects of sociodemographic characteristics on the causal attribution of mental illness, three multivariate linear regression models were run separately using each of the causal belief factors as dependent variables, while sociodemographic variables such as age, gender, ethnicity and year of study, were treated as independent variables. Other independent variables comprise social contact with a person(s) with mental illness such as having a close friend or family with mental illness and past experience in the mental health field. In order to elucidate the impact of causal attributions on help-seeking attitudes, three multivariate linear regression

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models were performed using each of the IASMHS factors as the dependent variable, while the aforementioned variables with the addition of causal beliefs factors were treated as independent variables. Data were analyzed with the Statistical Package for Social Sciences V.23.0 (SPSS) and all statistically significant results are reported at $p < 0.05$.

2.4 Patient and Public Involvement

This research was done without patient involvement. No patients were involved in the planning or design of this study, nor consulted to develop patient relevant outcomes or interpret the results. No patients were invited to contribute to the writing or editing of this document for readability or accuracy.

3. RESULTS

3.1 Descriptive Analysis

The demographic characteristics of our participants are shown in Table 1. The majority of participants were female (60.3%) and of Chinese ethnicity (82.8%). The mean (±SD) age of the participants was 22.8 ± 2.2 years. In terms of years of study in the university, 33.3% were in Year 1, 24.9% in Year 2, 20.3% in Year 3 and 21.5% were in Year 4. 42.6% of participants knew of at least one close friend or family member who has a mental illness, and 22.2% had past experience within the mental health field. 0.5% (n=2) had missing data for the variable past experience within the mental health field.

Table 1: Sociodemographic characteristics of participants. (n = 390)

		Mean	SD
Age		22.2	2.2
		N	%
Gender			
	Male	155	39.7

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	Female	235	60.3
Ethnicity			
	Chinese	323	82.8
	Non-Chinese	67	17.2
Year of Study			
	Year 1	130	33.3
	Year 2	97	24.9
	Year 3	79	20.3
	Year 4	84	21.5
Close friend or family member who has a mental illness			
	Yes	166	42.6
	No	224	57.4
Past experience within mental health field			
	Yes	86	22.2
	No	301	77.8

3.2 Descriptive Statistics on Causal Beliefs of Depression

Table 2 lists the mean score of each causal attribution of depression. The mean score for the 3 factors of causal beliefs were 1.8 ± 0.8 for physical attribution (3.1% had missing data, n=12), 4.2 ± 0.5 for psychosocial attribution (2.3% had missing data, n=9) and 3.1 ± 1.0 for personality attribution (7.7% had missing data, n=30).

Table 2: Descriptive statistics on the Causal Beliefs of Depression

	Physical	Psychosocial	Personality
Mean (SD)	1.8 (0.8)	4.2 (0.5)	3.1 (1.0)
Range	1.0 - 4.5	2.0 - 5.0	1.0 - 5.0

3.3 Multivariate Linear Regressions of Casual Beliefs Factors and Help-seeking Attitudes

Results from multivariate linear regressions found no significant socio-demographic predictors for physical attribution of mental illness (Table 3). On the other hand, younger age significantly predicted higher psychosocial attribution, while having close family or friends with mental

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illness or past experience in the mental health scene were both negatively associated with

personality attribution.

Table 3: Sociodemographic Correlates of 3 Causal Belief Factors

		Physical			Psychosocial			Personality	
	B	95% CI	p-value	β	95% CI	p-value	β	95% CI	p-value
Age	-0.018	-0.065 to 0.029	0.457	-0.035	-0.067 to -0.004	**0.029***	0.009	-0.048 to 0.065	0.757
Gender									
Male (Ref)									
Female	-0.041	-0.240 to 0.159	0.689	0.030	-0.104 to 0.163	0.665	0.149	-0.089 to 0.387	0.218
Ethnicity									
Chinese (Ref)									
Non-Chinese	0.086	-0.147 to 0.319	0.467	0.108	-0.045 to 0.261	0.167	0.250	-0.029 to 0.530	0.079
Years of Study									
Year 1 (Ref)									
Year 2	-0.223	-0.458 to 0.012	0.063	-0.034	-0.193 to 0.124	0.671	-0.145	-0.425 to 0.135	0.309
Year 3	-0.170	-0.430 to 0.089	0.198	-0.075	-0.249 to 0.099	0.397	-0.076	-0.384 to 0.231	0.626
Year 4	-0.073	-0.345 to 0.198	0.596	0.033	-0.150 to 0.215	0.726	-0.068	-0.390 to 0.254	0.677
Close friend or family with MI									
Yes	-0.170	-0.350 to 0.010	0.065	0.074	-0.047 to 0.194	0.231	-0.229	-0.444 to -0.015	**0.036***
No (Ref)									
Past Experience in mental health field									
Yes	0.052	-0.161 to 0.265	0.632	0.110	-0.033 to 0.253	0.130	-0.297	-0.551 to -0.044	**0.021***
No (Ref)									

* denotes significant association at p-value <0.05

With regards to help-seeking attitudes, multivariate linear regressions identified stronger

psychosocial attribution to be associated with higher 'Help-seeking Propensity' whereas stronger

personality attribution was linked to lower 'Psychological Openness' and 'Indifference to

Stigma' (refer to Table 4). In addition, being a male was significantly associated with poorer

scores on 'Psychological Openness' and 'Indifference to Stigma', while participant's year of

study and 'Indifference to Stigma' scores had an inverse relationship. Lastly, past experience in

mental health field was significantly associated with both 'Psychological Openness' and 'Help-

seeking Propensity' while having a close friend/relative with mental illness was only

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significantly associated with 'Psychological Openness'. (refer to Table 4). 0.5%(n=2) of participants had missing data for 'Psychological Openness' factor, 0.3%(n=1) for 'Help-seeking Propensity', and 1.0%(n=4) for 'Indifference to Stigma'.

Table 4: Multivariate Regression for Help-seeking Attitudes

	Psychological Openness			Help-seeking Propensity			Indifference to Stigma		
	β	95% CI	p-value	β	95% CI	p-value	β	95% CI	p-value
Age	0.190	-0.081 to 0.461	0.168	0.250	-0.021 to 0.520	0.070	0.236	-0.131 to 0.604	0.206
Gender									
Male (Ref)									
Female	2.310	1.163 to 3.458	**<0.001****	-0.759	-1.904 to 0.385	0.193	1.573	0.014 to 3.131	**0.048***
Ethnicity									
Chinese (Ref)									
Non-Chinese	-0.294	-1.681 to 1.093	0.677	1.343	-0.040 to 2.725	0.057	1.487	-0.404 to 3.378	0.123
Years of Study									
Year 1 (Ref)									
Year 2	0.225	-1.136 to 1.585	0.745	0.569	-0.787 to 1.925	0.410	-1.854	-3.696 to -0.011	**0.049***
Year 3	-0.552	-2.041 to 0.938	0.467	-0135	-1.620 to 1.351	0.859	-3.091	-5.119 to -1.064	**0.003****
Year 4	0.089	-1.470 to 1.647	0.911	0.773	-0.781 to 2.326	0.329	-1.969	-4.090 to 0.153	0.069
Close friend or family with MI									
Yes	2.532	1.479 to 3.585	**<0.001****	0.142	-0.908 to 1.192	0.791	0.949	-0.483 to 2.380	0.193
No (Ref)									
Past Experience in mental health field									
Yes	20.70	0.829 to 3.310	**0.001****	1.602	0.365 to 2.839	**0.011***	0.463	-1.219 to 2.146	0.588
No (Ref)									
Causal Beliefs									
Physical	-0.301	-0.897 to 0.295	0.321	0.086	-0.508 to 0.681	0.776	-0.640	-1.449 to 0.170	0.121
Psychosocial	-0.083	-0.965 to 0.799	0.853	1.252	0.373 to 2.132	**0.005****	-0.045	-1.242 to 1.152	0.941
Personality	-1.133	-1.650 to -0.616	**<0.001****	0.002	-0.513 to 0.518	0.993	-0.711	-1.417 to -0.005	**0.048***

* denotes significant association at *p-value* <0.05
** denotes significant association at *p-value* <0.01

4. DISCUSSION

Consistent with the findings of the study by Pang et al. (2018), physical causes (μ =1.86 ± 0.85) was the least endorsed attribution of depression amongst our participants, followed by personality causes (μ =3.18 ± 1.00) and psychosocial causes (μ = 4.25 ± 0.57). Pang et al. (2018) also found age differences in psychosocial beliefs, with older adults (35-49 years) being less

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likely than younger adults (18-34 years) to endorse psychosocial beliefs. Several studies have reported that endorsement of psychosocial causes of depression such as negative life events, broken homes, and lack of parental affection, reduces stigma and the desire for social distance [29-31]. Since causal attributions are linked to stigma [9][12] and younger adults tend to show less stigma towards mental illness [30][32], this possibly explains the age differences in psychosocial beliefs observed in our study. Taking into consideration the narrow age range of our participants, the age differences found in our study perhaps reflect the improvements of awareness initiatives that were integrated within educational settings over the years.

With regards to help-seeking attitudes, our multiple linear regression analysis found several significant associations between subscales of IASMHS and socio-demographic factors, as well as between subscales of IASMHS and causal attribution of mental illness.

Having a close friend/family member with mental illness and past experience in the mental health field were both associated with lower scores on personality attribution, and this could be due to the effects of social contact with individuals who have mental illness. Intergroup contact has been suggested to improve mental health literacy, increase empathy and reduce stigma [33]. Hence, this finding may be tied to participants having a better understanding about the multifactorial causes of depression, and knowing that it is unlikely to be caused by just a 'weak or nervous personality'.

Interestingly, having a close friend/family with mental illness and past experience in the mental health field were also significantly correlated to "Psychological Openness" scores, but only past experience in mental health field was significantly correlated to "Help-seeking Propensity" scores. A plausible explanation would be that intergroup contact helped to reduce stigma and thus promoted participant's willingness to acknowledge their psychological challenges and be

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open about it. However, "Help-seeking Propensity' measures participant's knowledge of where to seek help and their perceived capability/willingness to do so. In which case, intergroup contact with just friends/family with mental illness may not necessarily enhance their 'Help-seeking Propensity'. On the other hand, having past experience in the mental health field would arguably improve their mental health literacy, thereby positively influencing their knowledge of where and when to seek help, as well as the perceived helpfulness of doing so. Nonetheless, further research may be needed to explore this phenomenon of how different forms of social contact affect help-seeking differentially.

Consistent with the extant literature, our study found a gender bias in help-seeking attitudes [25][34][35], with females scoring significantly higher in "Psychological Openness" and "Indifference to Stigma" than their male counterparts. The gender differences in our findings might be due to cultural ideologies of masculinity [36] where admitting that one has a mental health problem is akin to revealing one's weaknesses, and this is compounded by the perception that people who seek psychological treatment are often stereotyped as "weak"[9]. This possibly explains why males in the study were less open to acknowledging their psychological problems if any, and at the same time more apprehensive about others finding out should they seek treatment.

Our analysis also showed that attributing the cause of depression to an individual's personality was associated with lower "Psychological Openness" and "Indifference to Stigma". This negative association between personality attribution and the two aforementioned help-seeking factors could be related to stigma. A study by Reavley and Jorm (2014) established that the belief in personality being a cause of mental illnesses is associated with higher personal *weak not sick* stigma [12]. As such, attributing the cause of mental illness to a 'weak or nervous' personality is likely to engender denial towards one's condition, for it implies that mental illness is within a

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person's control (*weak*) and not a genuine medical issue (*not sick*) [22] [37]. This could results in self-blame and feelings of shame, which consequently leads to greater self-stigma and difficulty in acknowledging one's mental health problems [38-40], as well as greater consternation about others knowing should they seek treatment.

Personality attribution may also exacerbate the denial of one's condition especially in Asian cultures where having a mental illness is commonly seen as a disgrace to the family. A case in point would be the Chinese culture, where a mental illness is seen as a mark of shame that "tarnishes family honour, name and ancestors" [41]. In this case, personality attribution is likely to invoke feelings of blame and guilt on the sufferer for being unable to 'endure' one's problem, consequently fostering a strong antipathy towards acknowledging one's condition. Further, the belief that one can handle their symptoms on their own has been found to affect help-seeking intentions [10] [18] [42]. As such, the belief that mental illness is due to a "weak or nervous" personality might inhibit an individual's openness to the idea of seeking help, especially so in cultures where seeking treatment is viewed as "a lack of endurance, personality strength and dignity" [41]. Conceivably, in such scenarios, individuals would face greater inertia in confronting their psychological issues (lower "Psychological Openness"), and also perceive greater stigma in seeking treatment (lower "Indifference to Stigma").

In contrast, higher "Help-seeking Propensity" scores were linked to greater endorsement of psychosocial attribution. The perceived need for psychological treatment from professionals and the perceived helpfulness of doing so has been shown to influence help-seeking attitudes [10] [11] with individuals who endorsed psychosocial attributions being more likely to regard it as a treatable condition [43], and are therefore more willing to seek treatment. An alternative explanation could be linked to how psychosocial causes (i.e. childhood maltreatment and trauma)

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alludes to external factors that are beyond an individual's control. It has been shown that attribution of mental illness to external factors is positively associated with help-seeking [44], possibly because it evokes less self-afflicted blame and guilt within the individual. Furthermore, as mentioned above, several studies have reported that endorsement of psychosocial causes of depression reduces stigma and desire for social distance [29-31]. Based on these findings, it can be postulated that when mental illness is attributed to psychosocial causes, individuals may be more willing to seek help as they perceive less stigma associated with the illness.

Another interesting finding is that as university students progress in their year of study in the school, their scores on "Indifference to Stigma" tend to decrease. A possible explanation could be due to the fear of being labelled which in turn may lead to others regarding them as less competent [9 45]. Thus, students may worry about their peers finding out that they are seeking treatment and thereby perceive them as weak or burdensome individuals who are unable to contribute sufficiently in projects/assignments. Alternatively, it may be that as students gradually progress in University, they tend to have larger social networks in school. Hence, there would be greater concern about others finding out that they are seeking treatment because of the stigma associated with the label [45] and the fear of losing their social standing in school.

Similar findings in terms of the association between causal attribution of mental illnesses and help-seeking attitudes have been reported in previous studies [14 46]. Chen and Mak's (2008) study, which also comprised undergraduate students, reported that help-seeking likelihood was positively correlated to attribution of mental illness to environmental/hereditary causes and negatively correlated to social-personal causes [14]. This corroborates our study's finding that help-seeking attitudes are more likely to be unfavorable when the etiological cause of mental illness is attributed to person-related reasons, whereas attributing mental illness to psychosocial reasons,

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likely encourages help-seeking. However, another study that investigated the relationship between causal beliefs of mental illness and help-seeking attitudes among a sample of persons with untreated depressive syndromes had slightly dissimilar results [46]. The study found that lower attribution to person-related causes was linked to greater perceived need for help among participants with prior treatment experience. In contrast, attribution to biomedical causes was related to greater perceived need and stronger help-seeking intentions among participants without prior treatment experience. On the contrary, attributions to childhood trauma or stress - which were more related to our psychosocial factor- were not significantly associated with help-seeking in this study. A juxtapose of these two previous studies with the current one hence suggests that attribution of mental illness to person-related causes may have quite a universal impact on help-seeking, whereas the same may not be said for psychosocial causes.

Several studies which had also utilized the IASMHS demonstrated "Help-seeking Propensity" to be the greatest factor out of the three to predict mental health service use [27 28 35]. Notably, it is recommended for future interventions targeting university students to emphasize more on psychosocial causes of mental illness, while addressing the beliefs that attribute mental illness to the personality of the individual, given its impairments on help-seeking attitudes. Importantly, our study also found that having social contact with individuals with mental illness reduces attribution of personality as a cause of mental illness. As such, it would be beneficial for future anti-stigma interventions or mental health literacy programs to also incorporate social contact with people who have mental illness, in order to challenge misconceptions towards mental illnesses [33]. In view of these considerations, and given that young people are most at risk of developing mental illness[19], there is perhaps a need for mental health literacy to be introduced earlier to youths.

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There were some limitations to our study worth mentioning. Because our study utilized convenience sampling, we had to compare between two broad ethnic groups i.e., Chinese versus non-Chinese, as we did not have enough participants to represent the other major local ethnic groups (Malays and Indians). Hence, we were unable to elucidate the influence that other ethnic cultures may have on causal beliefs and help-seeking. The generalizability of our finding is another limitation. Since we used only the depression vignette in our study, our findings may not necessarily translate to other mental illnesses, and as our sample only comprised University students, our findings might not be indicative of youths in other settings. Lastly, the factor structure for the causal belief scales adopted in this study was generated from an exploratory factor analysis of a previous nationwide study in Singapore, which has yet to be validated in a University population which may have foreign students as well. Nonetheless, this factor structure was used as we believe it to be culturally relevant, given that the factor structure was generated locally, and Singapore happens to be a very small nation; moreover, the non-Singapore resident students constitute only a minority of the sample (n=70).

Notwithstanding these limitations, findings from our study provide some useful insights into the relationship between causal beliefs and help-seeking attitudes amongst young people in University. Future similar research should target young people in other settings, and to examine ethnic differences in causal beliefs and help-seeking behavior. Also, future studies could look into other causal beliefs of mental illness (such as biogenetics and supernatural causes, which were not investigated in this study) and how stigma moderates the relationship between causal beliefs of mental illness and help-seeking attitude.

Findings from our study have several implications. Firstly, the design of interventions to improve help-seeking attitudes amongst University students should consider the receptivity of male

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students, given that they have less positive help-seeking attitudes than their female counterparts. Secondly, our findings have shown the importance of causal beliefs on help-seeking attitudes. In order to mitigate the wide treatment gap amongst young people, future anti-stigma interventions should also focus on addressing the causes of mental illness. Finally, to better ameliorate the misconceptions regarding the causes of mental illness and correct stereotypes, anti-stigma interventions should also incorporate contact with an individual who has mental illness, and mental health literacy should be introduced to youths as early as possible.

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Data sharing statement: Readers who wish to gain access to the data can write to the senior author MS @ mythily@imh.com.sg to request access.

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Appendix A: Vignette

Please read the vignette below and answer the following questions. Indicate your answers by circling the appropriate box

Adam is 30 years old. He has been feeling unusually sad and miserable for the last three weeks. Friends noticed he is no longer his usual cheerful self and he has declined all social gatherings over the past two weeks. Even though he is tired all the time, he has trouble sleeping almost every night. Adam doesn't feel like eating and has lost weight. He can't focus on his work and puts off making decisions. Adam feels worthless and even everyday tasks seem too much for him. This has come to the attention of his boss, who is concerned about Adams's poor work performance.

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

	Item No	Recommendation	Page No
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	2-3
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4-6
Objectives	3	State specific objectives, including any prespecified hypotheses	6
Methods			
Study design	4	Present key elements of study design early in the paper	6-7
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	6-7
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	7
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	N.A
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	7-8
Bias	9	Describe any efforts to address potential sources of bias	7
Study size	10	Explain how the study size was arrived at	N.A
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	9
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	9
		(*b*) Describe any methods used to examine subgroups and interactions	N.A
		(*c*) Explain how missing data were addressed	N.A (Linear regression automatically handles missing data)
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	N.A
		(*e*) Describe any sensitivity analyses	N.A
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	7
		(b) Give reasons for non-participation at each stage	N.A

		(c) Consider use of a flow diagram	N.A
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	10-11
		(b) Indicate number of participants with missing data for each variable of interest	10-12
Outcome data	15*	Report numbers of outcome events or summary measures	11-12
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	9-12
		(*b*) Report category boundaries when continuous variables were categorized	N.A
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	N.A
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	N.A
Discussion			
Key results	18	Summarise key results with reference to study objectives	13-14
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	18
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	18-19
Generalisability	21	Discuss the generalisability (external validity) of the study results	18
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	22