ASSOCIATION OF MENTAL HEALTH KNOWLEDGE, STIGMA, AND HELP-SEEKING WITH DEPRESSION SYMPTOMS AMONG YOUNG MALAYSIAN ADOLESCENTS

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ABSTRACT

This study examines the association between the mental health knowledge, stigma and help-seeking components of Mental Health Literacy (MHL) with depression symptoms among young adolescents in Malaysia. A cross-sectional study was conducted involving 1,365 students selected randomly from 50 National Secondary Schools in Selangor from August to November 2017. MHL was assessed using the Mental Health Literacy and Stigma questionnaire (MHLS) and the Centre of Epidemiological Studies Depression Scale (CESD) was used to screen for depression symptoms. Multivariate regression analysis was used to examine this association. Mental health knowledge, such as keeping the person busy as a helpful first aid action (negative first aid action) (AOR=1.75 (95% CI 1.19, 2.59), and getting out into the sunlight as a harmful intervention (unhelpful knowledge of intervention) (AOR=2.22; 95% CI 1.10, 4.50), were significantly associated with depression. In regard to stigma components, personal stigmatising attitudes such as not telling anyone if you have a problem like the person described in the vignette (AOR=2.52; 95% CI 1.50, 4.26) and perceiving the person described in the vignette as being dangerous to others (AOR=2.49; 95% CI 1.36, 4.55) were significantly associated with depression. Not endorsing family as a source of help (AOR=2.19; 95% CI 1.02, 4.69), worried what others might think if help is sought (AOR=1.67; 95% CI 1.02, 2.75), feeling that nothing can help (AOR=1.66; 95% CI 1.01, 2.70), were help-seeking components significantly associated with depression. Addressing these components of MHL could be key in reducing depression among adolescents.

KEYWORDS: Depression, Mental Health Literacy, Adolescents

INTRODUCTION

The World Health Organization (WHO) has reported depression as the largest contributor to disability globally in the year 2020, and the main cause of disease burden worldwide by 2030 (1). Depression is a common mental health disorder (MHDs) affecting adolescents worldwide. Globally, it is estimated that about a quarter of adolescents suffer from at least a single episode of depression before the age of 18. The mean age for adolescent depression is 15 years old, and symptoms usually develop three to four years before diagnosis (2). Furthermore, the severity of depression tends to increase by the age of 12 (3). More concerning is the fact that only a minority of these adolescents seek treatment, and among those who seek treatment, the majority do not comply with it (4). This has resulted in the rising prevalence of depression among adolescents globally such as in Australia (19% to 26% between 2014 and 2018), United States (8.1% to 15.8% between 2009 and 2019), and Singapore (four-fold increase between 2013 and 2018) (5,6,7). In Malaysia, the prevalence of depression symptoms among adolescents has increased from 15% in 2009 to 23% in 2017, with Selangor being the state with the highest prevalence (8,9).

Despite significant improvements in the Malaysian healthcare system, the prevalence of depression continues to increase (8). The reasons for this are the refusal of adolescents to disclose symptoms of depression early on, denial of the presence of depression symptoms, poor ability to recognise depression, and difficulty in articulating symptoms of depression (10). With the rising prevalence of depression and the escalating financial cost related to this disorder, the field of Mental Health Literacy (MHL) has become the focus of public health research (11). The MHL framework consists of three interrelated components, namely mental health knowledge, stigma, and help-seeking which have been shown to reduce the risk of developing MHDs (12).

However, the majority of previous studies that examined the relationship between MHL and depression tended to focus narrowly on a single component of MHL rather than examining all the components (12,13,14). Despite this, several of these studies do report a significant association between the knowledge, help-seeking and stigma components of MHL with depression among adolescents (12,13,14). However, as MHL is multifaceted, it is important to examine the association of individual components of MHL with depression. Being able to identify which component exactly within the MHL framework is associated with depression would assist in developing and instituting targeted interventions, especially for younger adolescents since depression tends to start during the early adolescent period (13). To date, there is a paucity of evidence that has examined the relationship between individual components of MHL and depression among young adolescents in Malaysia. Therefore, this study aims to examine the association between the mental health knowledge, stigma, and help-seeking components of MHL with depression symptoms among young adolescents in Malaysia.

MATERIALS AND METHODS

Study design and participants

A cross-sectional study was conducted involving students from National Secondary Schools in Selangor from August to November 2017. Using a two-stage sampling method, 50 schools were randomly selected from the list of national secondary schools in Selangor. At the school level, Form 1 students were sampled universally to participate in this study. Only Form 1 students were selected for this study as they are considered young adolescents (aged between 12 and 14) and are not involved in major examinations that have no effect on their academic work due to possible changes in the classroom schedule.

Data collection

Data was collected by the researcher from 1,365 respondents whose parents provided written consent for their child to participate in this study, which used self-administered questionnaires that were distributed to students in their respective classrooms. The response rate was 100%. The sample size was estimated using the Open Epi (version 3.01) sample size calculator, wherein a minimum of 1,300 samples were required for this study based on variables from a previous study that examined the association between MHL and depression amongst adolescents in China (12).

Measures

Sociodemographic variables collected included age, gender, ethnicity, smoking status, alcohol consumption, illicit drug use, been bullied, felt lonely, parental supervision, income, and marital status. MHL was examined using the Mental Health Literacy and Stigma questionnaire (MHLS) which presents a depressed vignette based on DSM criteria, following which participants are presented with questions based

on the person described in the vignette to examine (a) mental health knowledge (i.e Knowledge on first aid, interventions and preventions for depression), (b) stigma (i.e personal/perceive stigma) and help-seeking (sources of help and barriers to help-seeking) (15). The Centre of Epidemiological Studies Depression Scale (CESD) was used to screen for depression symptoms among adolescents, wherein a cut-off point of 27 has been determined to differentiate depressed and normal individuals among the Malaysian adolescent population (16). Both the MHLS and CESD were found to be reliable and valid tools for use among Malaysian adolescents (16,17).

Analysis

Data were analysed using Statistical Program for the Social Sciences (SPSS) version 24.0. The descriptive analysis includes frequency and percentages. To examine the association between mental health knowledge, stigma and help-seeking components of MHL with depression symptoms; the multivariate binary logistic regression analysis was performed. Categorical variables were examined for evidence of multicollinearity using the Cramer's V, wherein any two variables with a Cramer's V value of >0.3 are considered to have evidence of multicollinearity (18). Variables were also tested for evidence of interaction using the test of the interaction function in SPSS, whereby a significant value (p<0.05) indicates that interaction is present. Variables with p<0.25 of univariate analysis, with no evidence of multicollinearity and interaction, were considered significant and included in the multivariable analysis (18).

RESULTS

A total of 1365 adolescents participated in this study, of which 558 (40.9%) and 807 (59.1%) were male and female participants, respectively. The majority of participants were aged 13 years. Only a minority of participants were smokers (4.4%), consumed alcohol (7.5%), had illicit drug use (0.7%), been bullied (17.1%), and felt lonely (38.5%). Depression symptoms were reported among 222 (16.3%) participants (Table 1). The descriptive analysis of the mental health knowledge, stigma, and help-seeking components of MHL is shown in Tables 2-4. In total, there were 51 variables that were significant at 0.25 in univariate analysis as shown in Appendix 1. Following multivariate analysis, several demographic and MHL variables were significantly associated with depression symptoms (Table 5). Demographic variables

that were significantly associated with depression symptoms, included Indian descent (AOR=0.22; 95% CI 0.08, 0.55) and being female (AOR=2.08; 95% CI 1.28, 3.37). Having felt lonely (AOR=7.43; 95% CI 4.73, 11.66), been bullied (AOR=2.76; 95% CI 1.53, 4.97), and a lack of parent supervision (AOR=2.30; 95% CI 1.27, 4.17), were significantly associated with depression symptoms. In regards to the MHL variable, the mental health knowledge variables, namely regarding keeping the person busy as a helpful first aid action (AOR=1.75; 95% CI 1.19, 2.59) and getting out into the sunlight as a harmful intervention (AOR=2.22; 95% CI 1.10, 4.50), were significantly associated with a higher odds of depression symptoms. Regarding the stigma components, personal stigmatising attitudes such as not telling anyone if you have a problem like the person described in the vignette (AOR=2.52; 95% CI 1.50, 4.26) and perceiving the person described in the vignette as being dangerous to others (AOR=2.49; 95% CI 1.36, 4.55) were also significantly associated with depression symptoms. Help-seeking variables regarding sources of help and barriers to help-seeking, namely not endorsing family as a source of help (AOR=2.19; 95% CI 1.02, 4.69), being worried about what others might think if help is sought (AOR=1.67; 95% CI 1.02, 2.75), feeling that nothing can help (AOR=1.66; 95% CI 1.01, 2.70) and difficulty to get an appointment (AOR =1.85; 95% CI 1.07, 3.19), were also significantly associated with depression symptoms.

DISCUSSION

This study found that the suggestion of keeping the person busy as helpful first aid is significantly associated with an increased odds of depression symptoms among adolescents. This finding infers those individuals who adopt distraction forms of first aid, such as keeping a person busy when dealing with depression, could cause a worsening of depression symptoms. Several reasons can explain this finding. Keeping the person busy is an example of distraction first aid which hinders the development of coping skills among adolescents when faced with such problems (14). Instead of dealing with the underlying problem, adolescents deflect or ignore it by keeping themselves busy. This would also result in delayed help-seeking and a worsening of depression symptoms (14). It is also possible that such forms of distraction first aid would only momentarily suppress symptoms while the person is actively involved in these activities, and once the activity is over their symptoms would return, resulting in a temporary suppression of

Table 1. Characteristics of participants

Characteristics	Frequency N (%)
Gender	
Male	558 (40.9)
Female	807 (59.1)
Age (Years)	
12	19 (1.4)
13	1283 (94)
14	63 (4.6)
Ethnicity	
Malay	906 (66.4)
Chinese	260 (19.0)
Indian	171 (12.5)
Others	28 (2.1)
Smoker	
Yes	60 (4.4)
No	1305 (95.6)
Consumed alcohol	
Yes	103 (7.5)
No	1262 (92.5)
Illicit drug use	
Yes	9 (0.7)
No	1356 (99.3)
Been bullied	
Yes	234 (17.1)
No	1131 (82.9)
Felt lonely	
Yes	526 (38.5)
No	839 (61.5)
Parental supervision	
Yes	955 (70.0)
No	410 (30.0)
Parental marital status	
Married and living together	1215 (89.0)
Separated/Divorced	150 (11.0)
Parental monthly income	
Low (less than RM3000)	519 (38.0)
High (more than RM 3000)	846 (62.0)
Depression symptoms	
Yes	222 (16.3)
No	1143 (83.7)

Table 2. Knowledge component of Mental Health Literacy

Knowledge component	Frequency N (%)
First aid (Helpful of the following:)	
Listen to his problems	1335 (97.8)
Suggest seeking professional help	1138 (83.4)
Be physically active	1066 (78.1)
Keep him busy	649 (47.5)
Ignore him	74 (5.4)
Intervention (Helpful of the following:)	
Receiving counselling	1252 (91.7)
Family member	1246 (91.3)
Counsellor	1212 (88.8)
Relaxation training	1154 (84.5)
Teacher	1122 (82.2)
Friend	1121 (82.1)
Doctor	1105 (81.0)
Cutting down on smoking cigarettes	1038 (76.0)
Reading a self-help book	1013 (74.2)
Vitamin	1031 (75.5)
Cutting down on drinking of alcohol	1003 (73.5)
Cutting down on use of marijuana	988 (72.4)
Getting out in the sunlight	882 (64.6)
Search web for information	847 (62.1)
Antidepressants	760 (55.7)
Practicing meditation	728 (53.3)
Psychologist	668 (48.9)
Going to a local mental health service	628 (46.0)
Psychiatrist	601 (44.0)
Join a support group	538 (39.4)
Sleeping pill	247 (18.1)
Getting acupuncture	200 (14.7)
Smoking cigarettes	10 (0.7)
Drinking alcohol to relax	7 (0.5)
Using marijuana	9 (0.7)
Prevention (Yes to the following:)	
Always spend time with family	1287 (94.3)
Keeping physically active	1233 (90.3)
Keep regular communication with friends	1231 (90.2)
Avoiding stressful situations	1190 (87.2)
Making regular time for relaxing activities	1124 (82.3)

Table 3. Stigma component of Mental Health Literacy

Stigma component	Frequency N (%)
Personal Stigma (You personally agree to the following:)	
Could snap out of it if he wanted	1010 (74.0)
Ali's problem makes him unpredictable	1000 (73.3)
Ali's problem is a sign of personal weakness	682 (50.0)
Ali's problem is not a real medical illness	487 (35.7)
Would not tell anyone if you have a problem like Ali	419 (30.7)
Ali is dangerous to others	277 (20.3)
Best to avoid him	271 (19.9)
Perceive Stigma (Most people agree to the following:)	
Could snap out of it if he wanted	1040 (76.2)
Ali's problem makes him unpredictable	945 (69.2)
Would not tell anyone if you have a problem like Ali	774 (56.7)
Ali's problem is a sign of personal weakness	675 (49.5)
Ali's problem is not a real medical illness	530 (38.8)
Ali is dangerous to others	485 (35.5)
Best to avoid him	450 (33.0)

Table 4. Help seeking component of Mental Health Literacy

Help seeking component	Frequency N (%)
Source of help	
Family	1246 (91.3)
Counsellor/Psychiatrist	935 (68.5)
Friend	920 (67.4)
Teacher	832 (61.0)
Barriers of seeking help	
The person might give wrong information	838 (61.4)
The person might feel negatively about you	798 (58.5)
Worried what others might think of you	597 (43.7)
Worried about the negative effects of treatment	588 (43.1)
Too embarrassed/shy	544 (39.9)
Waiting time for appointment	423 (31.0)
Not enough money	415 (30.4)
Not liking the treatment	401 (29.4)
Difficult to get appointment	369 (27.0)
The person or service is far	352 (25.8)
Feeling that nothing can help	284 (20.8)

Table 5. Association between mental health knowledge, stigma, help-seeking with depression symptoms among adolescents

Variable	Univariate logistic regression		Multivariate logistic regression	
	Crude OR (95% CI)	p-value	Adjusted OR (95%CI)	p-value
Gender				
Male	1		1	
Female	2.14 (1.56, 2.95)	<0.0001*	2.08 (1.28, 3.37)	0.003**
Ethnicity				
Malay	1		1	
Chinese	0.39 (0.25, 0.62)	<0.0001*	0.58 (0.29, 1.17)	0.127
Indian	0.30 (0.17, 0.56)	<0.0001*	0.22 (0.08, 0.55)	0.001**
Others	1.34 (0.56, 3.21)	0.505	1.41 (0.39, 5.58)	0.599
Felt lonely				
Yes	7.90 (5.62, 11.11)	<0.0001*	7.43 (4.73, 11.66)	<0.0001**
No	1		1	
Been bullied				
Yes	3.07 (2.08, 4.54)	<0.0001*	2.76 (1.53, 4.97)	0.001**
No	1		1	
Parental supervision				
Yes	1		1	
No	2.86 (1.92, 4.27)	<0.0001*	2.30 (1.27, 4.17)	0.006**
Mental Health Knowledge				
First aid actions				
Keep him busy				
Helpful	1.38 (1.05, 1.83)	0.022*	1.75 (1.19, 2.59)	0.005**
Harmful	1		1	
Intervention				
Getting out in the sunlight				

Note. OR, Odds ratio; CI, Confidence interval; *Variables significant at 0.25 from univariate analysis are entered into multivariate analysis; **Significant set at p- value < 0.05 after multivariate analysis; 1 indicates reference group; Hosmer-Lemeshow goodness-of-fit test chi square = 6.79 (df = 8), p = 0.559; No significant interaction or multicolinearity was present among variable entered into multivariate analysis.

Variable	Univariate logistic regression		Multivariate logistic regression	
	Crude OR (95% CI)	p-value	Adjusted OR (95%CI)	p-value
Helpful	1		1	
Harmful	1.63 (1.03, 2.60)	0.039*	2.22 (1.10, 4.50)	0.027**
Mental Health Stigma				
Personal Stigma				
Would not tell anyone if having a problem				
Agree	4.77 (3.40, 6.70)	<0.0001*	2.52 (1.50, 4.26)	0.001**
Disagree	1		1	
Perceive Stigma				
Dangerous to others				
Agree	1.80 (1.29, 2.51)	0.001*	2.49 (1.36, 4.55)	0.003**
Disagree				
Mental Health Help-seeking	1		1	
Sources of help				
Family				
Yes	1		1	
No	4.12 (2.55, 6.66)	<0.0001*	2.19 (1.02, 4.69)	0.044**
Barriers to help-seeking (MH- Help-seeking)				
Worried what others might think				
Yes	3.36 (2.37, 4.76)	<0.0001*	1.67 (1.02, 2.75)	0.041**
No	1		1	
Feeling that nothing can help				
Yes	3.63 (2.61, 5.07)	<0.0001*	1.66 (1.01, 2.70)	0.044**
No	1		1	
Difficult to get an appointment				
Yes	1.87 (1.33, 2.62)	<0.0001*	1.85 (1.07, 3.19)	0.027**
No	1		1	

Note. OR, Odds ratio; CI, Confidence interval; *Variables significant at 0.25 from univariate analysis are entered into multivariate analysis; **Significant set at p- value < 0.05 after multivariate analysis; 1 indicates reference group; Hosmer-Lemeshow goodness-of-fit test chi square = 6.79 (df = 8), p = 0.559; No significant interaction or multicolinearity was present among variable entered into multivariate analysis.

depressive symptoms. The distraction hypothesis also suggests that, aside from physical activity, other forms of distractive activities that are more self-focused or introspective tend to have limited value in their ability to reduce depression symptoms (19). Another mechanism that mediates these findings is the adaptation of negative forms of distractive activities, whereby if a person keeps themselves busy by, for example, eating indulgently and drinking alcohol (20), this would worsen symptoms of depression (21). This is an important finding because it suggests that adolescents should be informed and educated to avoid such distraction first aid when dealing with depression.

In addition, we also found that depression symptoms were significantly associated with those who regarded going out into the sunlight as harmful. This finding suggests that depression symptoms worsen with a lack of exposure to sunlight. Several reasons can be attributed to this finding. First, exposure to light in the morning produces a phase advance that relieves depression. The reduced availability of sunlight, especially during winter, causes a phase delay in the circadian rhythm, which in some people leads to depression (22). Sunlight exposure has been found to affect cognition function whereby inadequate exposure to sunlight results in a reduction in brain blood flow and altered serotonin levels, resulting in depression (23). It is therefore important that adolescents be taught about the role sunlight has in reducing depression symptoms.

Furthermore, this study revealed that depression symptoms are significantly associated with the perceived dangerousness of a person with depression. These findings simply mean that adolescents suffering from depression generally have a higher perception that other people would regard them as being dangerous. This is a concerning finding as such a perception would result in avoidance behaviours, refusal to seek help and reluctance to disclose the underlying problem to anyone, due to the fear of being rejected because of the underlying perception of dangerousness that others have towards a person suffering from depression. Similar findings were reported in Sweden (24). Several reasons can explain this finding. Low impulse control and impaired affect regulation among depressed individuals might result in violence (25). Depressed adolescents often turn to substance use as a form of coping mechanism, and this could increase the risk of violence (24). The risk of violence is also increased in cases of non-adherence to treatment (24). A perception of danger might be due to several other sources of information, such as

information about symptoms or deviant behaviour by individuals suffering from mental disorders, which might originate from reports in the media of violent crimes committed by people with mental disorders(26). Findings regarding the significant association between perceived dangerousness and depression symptoms must be interpreted with caution, however, as although there is a risk of violence among individuals suffering from depression, the overwhelming majority of them are not violent (27).

This study results also support a statistically significant association between depression symptoms and not telling anyone if you are having a problem like the person described in the vignette. Adolescents who do not disclose or share their problems with others tend to have an increased odds of depression symptoms. There are several possible reasons for this finding. Not telling anyone, or disclosing the underlying problem, could cause delays in help-seeking, wrong diagnosis, noncompliance to treatment, the internalisation of problems and the use of inappropriate forms of interventions to deal with the underlying problems, which would increase the likelihood of depression (28). If a person believes that they are responsible for their depression, they bear more feelings of guilt and shame and may decide not to tell anyone about their problem (28). A lack of knowledge regarding depression as a disorder that requires treatment, along with a poor understanding of the consequences of depression on adolescent health would mean there is no sense of urgency to tell anyone if one is suffering from depression. It is also possible that individuals suffering from depression prefer not to disclose their problem to others for several reasons, such as fear of being prescribed medication, being unsure of how to raise the issue with others, a fear of being referred to a counsellor or psychiatrist, and being labelled a psychiatric patient (29).

In the present study, depression symptoms were significantly related to not seeking help from family members. These findings show that family members are important sources of help for adolescents who are suffering from depression. Similar findings were reported among adolescents in Australia (30). This finding can be explained in several ways. The phenomenon of help negation, which suggests that mood disorders such as depression result in a lack of motivation, increases the desire to keep feelings and concerns to oneself, therefore resulting in less frequently seeking help for problems (31). Adolescents who tend not to seek help from family members such as parents generally experience a delay

in professional help-seeking as parental recognition of a problem often acts as a crucial filter in the trajectory along which adolescents make timely utilisation of mental health services (31). It is also possible that adolescents believe their family members would disapprove the use of the mental health service, and they would thus demonstrate less intent to seek help from family or even mental health professionals, ultimately worsening their underlying depression (31). A lack of family involvement, especially parental involvement, in the process of help-seeking for adolescents who suffer from depression would impair maintenance of the professional relationship between adolescents and mental healthcare professionals over time, which would affect adherence to treatment and follow up, resulting in undesirable depression outcomes (32). Our findings suggest that both adolescents and family members (especially parents) are familiar with the role each should play to address emotional problems among adolescents.

Depression symptoms were significantly related in this study to being worried about what other people might think of you if help is sought, feeling that nothing can help and the difficulty to get an appointment. Considering the high rate of those who screened positive for depression, this perception is quite concerning, as it may affect the help-seeking attitudes of adolescents. Similar findings were reported in studies conducted among adolescents and adults in the United States and Australia (33). Several reasons can explain this finding. Adolescence is a period whereby embarrassment occurs constantly because this is the age when one is no longer a child but not yet an adult, and can be criticised on both fronts for either presuming to act too old or for not acting old enough (34). Depression is a disorder with a certain degree of stigma attached to it, and once again this could result in a magnification of feelings of embarrassment and worries about what others might think if help is sought, among depressed adolescents (35). According to the social rank theory, adolescents with depression perceive that by seeking help they will be looked down on by others and therefore feel inferior to others, resulting in the notion of being 'worried about what others might think of you' (36). Finally, knowledge due to a previous experience of stigmatisation among depressed adolescents who sought help could cause worries about what others might think if help is sought in the future.

The main strength of this study is that it examined the association of multiple components of MHL simultaneously with depression while controlling for possible confounding and interaction effects. In addition, to date, this is the first study to have analysed the association between the various components of MHL and depression among young Malaysian adolescents. The limitations of this study include the limited ability to generalise the findings to older adolescents in Malaysia and to establish causality. Future studies should aim to conduct longitudinal studies among adolescents to illicit causality.

CONCLUSION

Several variables from the knowledge, stigma, and help-seeking components of MHL are significantly associated with depression symptoms among adolescents. Addressing these components specifically by improving MHL early on could be key in reducing depression among adolescents. The findings from this study could be used as evidence to improve the existing school based mental health services (i.e educating school counsellor on helpful first aid action, preventive, intervention for depression, common barriers to help-seeking and stigmatising attitudes towards depression). In addition, the findings from this study could be used as a platform to initiate the development of a school-based depression educational programme with the aim of increasing MHL among young adolescents. In addition, it is also important to educate family members with regards to depression among adolescents as these individuals are common gatekeepers whom adolescents turn to for help.

CONFLICT OF INTEREST

The authors have no conflicts of interest to declare. All authors have read and approved the final version of the manuscript. Data is available upon request.

ETHICAL DECLARATIONS

The study was registered with National Medical Research Register (NMRR-18-719-40569). Ethics approval was obtained from University of Malaya Research Ethical Committee (UM.TNC 2/UMREC). Permission to use the School was approved by the Malaysian Ministry of Education, Kuala Lumpur State Education Department and respective School Principals. Written consent was obtained from the participant's guardians. Permission to use the study instruments was obtained from the original authors.

REFERENCES

1. World Health Organization. The Global Burden of Disease: 2004 update [Internet]. Vol. 2010, Update. 2008 [cited 2018 Aug 5]. p. 146. Available from: http://www.who.int/healthinfo/global_burden_disease/2004_report_update/en/index.html

2. Bostic JQ, Bagnell AL. Evidence-Based School Psychiatry, An Issue of Child and Adolescent Psychiatric Clinics of North America [Internet]. Vol. 2. Halifax, NS, Canada; 2012. 241 p. Available from: https://www.elsevier.com/books/evidence-based-school-psychiatry-an-issue-of-child-and-adolescent-psychiatric-clinics-of-north-america/bostic/978-1-4557-3839-7

3. Dekker M, Ferdinand R, Van Lang N, Bongers I, Ende Van Der J, Verhulst F. Developmental trajectories of depressive symptoms from early childhood to late adolescence: gender differences and adult outcome. J Child Psychol Psychiatry. 2007;48(7):657–66. doi.org/10.1111/j.1469-7610.2007.01742.x

4. World Health Organization. Mental Health Atlas 2005. World Health Organ Tech Rep Ser [Internet]. 2000;894(894):i–xii, 1–253. Available from: http://www.ncbi.nlm.nih.gov/pubmed/11234459

5. Lawrence D, Johnson S, Hafekost J, Boterhoven De Haan K, Sawyer M, Ainley J, et al. The Mental Health of Children and Adolescents. Report on the second Australian Child and Adolescent Survey of Mental Health and Wellbeing. Department of Health, Canberra. Commonwealth of Australia. 2015.

6. Daly M. Prevalence of depression among adolescents in the US from 2009 to 2019: analysis of trends by sex, race/ethnicity, and income. J Adolesc Heal. 2022; 70(3): 496-9. doi.org/10.1016/j.jadohealth.2021.08.026

7. Tan X, Arvind R, Kee E, To M, Leong K, Tor P, et al. A Six-Year Trend of Youth Depression in a Healthcare Group in Singapore. ASEAN Journal of Psychiatry. 2021 Oct;22(8):1–8.

8. Latiff L, Tajik E, Ibrahim N, Abubakar A, Ali S. Depression and its associated factors among secondary school students in Malaysia. Southeast Asian J Trop Med Public Health. 2016;47(1):131–41.

9. Institute for Public Health. National Health and Morbidity Survey 2017: Adolescent Health and Nutrition Survey [Internet]. Kuala Lumpur, Malaysia; 2017. Available from: http://iku.moh.gov.my/images/IKU/Document/REPORT/NHMS2017/NHMS2017Infographic.pdf

10. Cook M, Peterson J, Sheldon C. Adolescent depression: an update and guide to clinical decision making. Psychiatry. 2009;6(9):17–31.

11. Kessler R, Berglund P, Demler O, Jin R, Merikangas KR, Walters EE. Lifetime Prevalence and Age-of-Onset Distributions of DSM-IV Disorders in the National Comorbidity Survey Replication. Arch Gen Psychiatry. 2005;62(6):593–602. doi.org/10.1001/archpsyc.62.6.593

12. Lam L. Mental health literacy and mental health status in adolescents: a population-based survey. Child Adolesc Psychiatry Ment Health. 2014;8(1):26. doi.org/10.1186/1753-2000-8-26

13. Singh S, Zaki R., Farid ND. A systematic review of depression literacy: Knowledge, help-seeking and stigmatising attitudes among adolescents. J Adolesc. 2019;74:154–72. doi.org/10.1016/j.adolescence.2019.06.004

14. Gulliver A, Griffiths K, Christensen H. Perceived barriers and facilitators to mental health help-seeking in young people: a systematic review. BMC Psychiatry. 2010;10(1):113. doi.org/10.1186/1471-244x-10-113

15. Reavley N, Jorm A. National survey of mental health literacy and stigma [Internet]. Department of Health and Ageing, Canberra. 2011 [cited 2017 Nov 30]. Available from: http://pmhg.unimelb.edu.au/__data/assets/pdf_file/0007/636496/National_Mental_Health_Literacy_Survey_Monograph.pdf

16. Ghazali SR, Elklit A, Balang R V, Chen YY. Concurrent validity and exploratory factor analysis of the malay version of center for epidemiologic studies-depression scale (CESD) among malaysian adolescents. ASEAN J Psychiatry. 2016;17(1):71–8.

17. Singh S, Zaki RA, Farid NDN. Adolescent mental health literacy and its association with depression. ASM Sci J. 2020; 13(5).

18. Bursac Z, Gauss CH, Williams DK, Hosmer DW. Purposeful selection of variables in logistic regression. Source Code Biol Med. 2008;3(17):1–8.

doi.org/10.1186/1751-0473-3-17

19. Craft L, Perna F. The Benefits of Exercise for the Clinically Depressed. Prim Care Companion J Clin Psychiatry. 2004;06(03):104–11. doi.org/10.4088/pcc.v06n0301

20. Primack B, Swanier B, Georgiopoulos A, Land S, Fine M. Association between media use in adolescence and depression in young adulthood: A longitudinal study. Arch Gen Psychiatry. 2009;66(2):181–8. doi.org/10.1001/archgenpsychiatry.2008.532

21. Sedas M. Distraction from depression can be a healthy coping skill [Internet]. Healthy Place. 2018 [cited 2018 Jul 19]. Available from: https://www.healthyplace.com/blogs/copingwithdepression/2018/5/distraction-from-depression-coping-skill

22. Jorm A, Christensen H, Griffiths K, Rodgers B. Effectiveness of complementary and self-help treatments for depression. Med J Aust. 2002;176(10):84–96. doi.org/10.5694/j.1326-5377.2002.tb04508.x

23. Leonard B, Myint A. Changes in the immune system in depression and dementia: Causal or coincidental effects? Dialogues Clin Neurosci. 2006;8(2):163–74. doi.org/10.31887/dcns.2006.8.2/bleonard

24. Fazel S, Wolf A, Chang Z, Larsson H, Goodwin GM, Lichtenstein P. Depression and violence: A Swedish population study. The Lancet Psychiatry. 2015;2(3):224–32. doi.org/10.1016/s2215-0366(14)00128-x

25. Nestor P. Mental disorder and violence: Personality dimensions and clinical features. Am J Psychiatry. 2002;159(12):1973–8. doi.org/10.1176/appi.ajp.159.12.1973

26. Jorm A, Reavley N, Ross A. Belief in the dangerousness of people with mental disorders: a review. Aust N Z J Psychiatry. 2012;46(11):1029–45. doi.org/10.1177/0004867412442406

27. Sowislo JF, Gonet-Wirz F, Borgwardt S, Lang UE, Huber CG. Perceived Dangerousness as Related to Psychiatric Symptoms and Psychiatric Service Use-a Vignette Based Representative Population Survey. Sci Rep. 2017;7(1). doi.org/10.1038/srep45716

28. Aromaa E, Tolvanen A, Tuulari J, Wahlbeck K. Personal stigma and use of mental health services among people with depression in a general population in Finland. BMC Psychiatry. 2011;11(52). doi.org/10.1038/srep45716

29. Bell R, Franks P, Duberstein PR, Epstein RM, Feldman MD, Garcia EF, et al. Suffering in silence: Reasons for not disclosing depression in primary care. Ann Fam Med. 2011;9(5):439–46. doi.org/10.1370/afm.1277

30. Sawyer M, Borojevic N, Ettridge K, Spence S, Sheffield J, Lynch J. Do help-seeking intentions during early adolescence vary for adolescents experiencing different levels of depressive symptoms? J Adolesc Health. 2012;50(3):236–42. doi.org/10.1016/j.jadohealth.2011.06.009

31. Wilson C, Deane F. Help-negation and suicidal ideation: the role of depression, anxiety and hopelessness. J Youth Adolesc. 2010;39(3):291–305. doi.org/10.1007/s10964-009-9487-8

32. Houle J, Chagnon F, Lafortune D, Labelle R, Paquette K. Correlates of Help-Seeking Behaviour in Adolescents Experiencing a Recent Negative Life Event. Can J Fam Youth. 2013;5(1):39–63. doi.org/10.29173/cjfy18947

33. Mojtabai R. Unmet Need for Treatment of Major Depression in the United States. Psychiatr Serv. 2009;60(3):297–305. doi.org/10.1176/ps.2009.60.3.297

34. Pickhardt C. Why So Sensitive? Adolescence and Embarrassment [Internet]. Psyhology Today. 2013 [cited 2018 Jan 3]. Available from: https://www.psychologytoday.com/us/blog/surviving-your-childs-adolescence/201310/why-so-sensitive-adolescence-and-embarrassment

35. Dardas L. A nationally representative survey of depression symptoms among Jordanian adolescents: Associations with depression stigma, depression etiological beliefs, and likelihood to seek help for depression. [Internet]. Vol. 78. Duke University; 2017. Available from: https://dukespace.lib.duke.edu/dspace/bitstream/handle/10161/14440/Dardas_duke_0066D_13898.pdf?sequence=1

36. Gilbert P. The relationship of shame, social anxiety and depression: the role of the evaluation of social rank. Clin Psychol Psychother. 2000;7(3):174–89. doi.org/10.1002/1099-0879(200007)7:3<174::AID-CPP236>3.0.CO;2-UU

APPENDIX 1: Association between mental health knowledge, stigma, help-seeking with depression symptoms among adolescents

Variable	Univariate logistic regression		Multivariate logistic regression	
	Crude OR (95% CI)	p-value	Adjusted OR (95%CI)	p-value
Gender				
Male	1		1	
Female	2.14 (1.56, 2.95)	<0.0001*	2.08 (1.28, 3.37)	0.003**
Age (Years)				
12	0.99 (0.29, 3.43)	0.990		
13	1			
14	1.65 (0.91, 3.01)	0.260		
Ethnicity				
Malay	1		1	
Chinese	0.39 (0.25, 0.62)	<0.0001*	0.58 (0.29, 1.17)	0.127
Indian	0.30 (0.17, 0.56)	<0.0001*	0.22 (0.08, 0.55)	0.001**
Others	1.34 (0.56, 3.21)	0.505	1.41 (0.39, 5.58)	0.599
Smoker				
Yes	1.45 (0.77, 2.73)	0.249*	0.70 (0.26, 1.89)	0.486
No	1		1	
Consumed alcohol				
Yes	0.53 (0.27, 1.04)	0.065*		
No	1			
Illicit drug use				
Yes	0.64 (0.08, 5.16)	0.677		
No	1			
Felt lonely				
Yes	7.90 (5.62, 11.11)	<0.0001*	7.43 (4.73, 11.66)	<0.0001**
No	1		1	
Been bullied				
Yes	3.07 (2.08, 4.54)	<0.0001*	2.76 (1.53, 4.97)	0.001**
No	1		1	

Variable	Univariate logistic regression		Multivariate logistic regression	
	Crude OR (95% CI)	p-value	Adjusted OR (95%CI)	p-value
Parental supervision				
Yes	1		1	
No	2.86 (1.92, 4.27)	<0.0001*	2.30 (1.27, 4.17)	0.006**
Parental marital status				
Married and living together	1			
Separated/Divorced	0.93 (0.27, 3.22)	0.914		
Parental monthly income				
Low (less than RM3000)	1			
High (more than RM 3000)	0.87 (0.60, 1.24)	0.430		
FIRST AID ACTIONS (KNOWLEDGE)				
Listen to his problems				
Helpful	1			
Harmful	2.61 (0.47, 14.31)	0.271		
Suggest seeking help				
Helpful	1		1	
Harmful	1.25 (0.62, 2.52)	0.537	1.17 (0.41, 3.34)	0.773
Ignore him				
Helpful	1.47 (0.83, 2.62)	0.289		
Harmful	1			
Keep him busy				
Helpful	1.38 (1.05, 1.83)	0.022*	1.75 (1.19, 2.59)	0.005**
Harmful	1		1	
FIRST AID ACTIONS (KNOWLEDGE)				
Be physically active				
Helpful	1		1	
Harmful	1.46 (0.86, 2.48)	0.166*	1.22 (0.58, 2.59)	0.604

Variable	Univariate logistic regression		Multivariate logistic regression	
	Crude OR (95% CI)	p-value	Adjusted OR (95%CI)	p-value
INTERVENTION (KNOWLEDGE)				
People				
Doctor	1			
Helpful	1.35 (0.70, 2.59)	0.371		
Harmful	1.08 (0.72, 1.61)	0.726		
Teacher				
Helpful	1			
Harmful	1.07 (0.55, 2.09)	0.834		
Counsellor				
Helpful	1			
Harmful	1.12 (0.58, 2.19)	0.733		
Psychologist				
Helpful	1			
Harmful	0.75 (0.48, 1,19)	0.320		
Psychiatrist				
Helpful	1		1	
Harmful	0.51 (0.30, 0.88)	0.015*	0.45 (0.21, 1.06)	0.060
Family member				
Helpful	1			
Harmful	2.19 (1.00, 4.80)	0.051*		
Friend				
Helpful	1		1	
Harmful	1.90 (1.19, 3.06)	0.008*	2.03 (0.97, 4.27)	0.062
Medication				
Vitamin				
Helpful	1			
Harmful	1.37 (0.73, 2.58)	0.327		

Variable	Univariate logistic regression		Multivariate logistic regression	
	Crude OR (95% CI)	p-value	Adjusted OR (95%CI)	p-value
Antidepressants				
Helpful	1		1	
Harmful	1.39 (0.99, 1.97)	0.059*	1.87 (0.99, 3.12)	0.06
Sleeping pill				
Helpful	1			
Harmful	1.12 (0.76, 1.66)	0.573		
ACTIVITIES				
Relaxation training				
Helpful	1		1	
Harmful	1.80 (0.87, 3.72)	0.115*	2.62 (0.84, 8.21)	0.099
Practicing meditation				
Helpful	1		1	
Harmful	0.83 (0.46, 1.48)	0.523	0.36 (0.15, 1.84)	0.190
Getting acupuncture				
Helpful	1		1	
Harmful	1.15 (0.69, 1.90)	0.601	1.29 (0.62, 2.66)	0.494
Getting out in the sunlight				
Helpful	1		1	
Harmful	1.63 (1.03, 2.60)	0.039*	2.22 (1.10, 4.50)	0.027**
Receiving counselling				
Helpful	1			
Harmful	0.89 (0.37, 2.15)	0.797		
Search web for information				
Helpful	1		1	
Harmful	0.97 (0.64, 1.46)	0.870	1.13 (0.63, 2.03)	0.682
Reading a self-help book				
Helpful	1		1	
Harmful	0.89 (0.49, 1.58)	0.664	0.96 (0.40, 2.31)	0.929

Variable	Univariate logistic regression		Multivariate logistic regression	
	Crude OR (95% CI)	p-value	Adjusted OR (95%CI)	p-value
Join a support group				
Helpful	1		1	
Harmful	1.21 (0.86, 1.71)	0.284	0.91 (0.55, 1.51)	0.722
Going to local mental health service				
Helpful	1		1	
Harmful	1.40 (0.96, 2.02)	0.077*	0.96 (0.56, 1.65)	0.879
Drinking alcohol to relax				
Helpful	0.85 (0.10, 7.13)	0.884		
Harmful	1			
Smoking cigarettes				
Helpful	3.49 (0.98, 12.46)	0.055*	2.81 (0.29, 26.93)	0.369
Harmful	1		1	
Using marijuana				
Helpful	1.47 (0.30, 7.12)	0.634		
Harmful	1			
Cutting down drinking alcohol				
Helpful	1			
Harmful	0.87 (0.54, 1.41)	0.576		
Cutting down smoking cigarettes				
Helpful	1			
Harmful	0.87 (0.52, 1.48)	0.610		
Cutting down use of marijuana				
Helpful	1		1	
Harmful	0.76 (0.44, 1.31)	0.323	0.84 (0.39, 1.83)	0.665

Variable	Univariate logistic regression		Multivariate logistic regression	
	Crude OR (95% CI)	p-value	Adjusted OR (95%CI)	p-value
PREVENTION (KNOWLEDGE)				
Keeping physically active				
Yes	1		1	
No	1.41 (0.71, 2.80)	0.322	1.39 (0.39, 4.97)	0.617
Avoiding stressful situations				
Yes	2.10 (0.95, 4.64)	0.065*	2.38 (0.70, 8.05)	0.163
No	1		1	
Regular communication with friends				
Yes	1		1	
No	1.18 (0.61, 2.31)	0.625	1.24 (0.39, 3.94)	0.714
Spend time with family				
Yes	1		1	
No	1.51 (0.71, 3.21)	0.284	0.82 (0.19, 3.45)	0.785
Time for relaxing activities				
Yes	1		1	
No	1.44 (0.77, 2.71)	0.257	0.99 (0.34, 2.95)	0.991

Note. OR, Odds ratio; CI, Confidence interval; *Variables significant at 0.25 from univariate analysis are entered into multivariate analysis;**Significant set at p- value < 0.05 after multivariate analysis; 1 indicates reference group; Hosmer-Lemeshow goodness-of-fit test chi square = 6.79 (df = 8), p = 0.559; No significant interaction or multicolinearity was present among variable entered into multivariate analysis.

Variable	Univariate logistic regression		Multivariate logistic regression	
	Crude OR (95% CI)	p-value	Adjusted OR (95%CI)	p-value
PERSONAL STIGMA				
Could snap out of it				
Agree	0.99 (0.67, 1.48)	0.972		
Disagree	1			
Sign of personal weakness				
Agree	1.08 (0.76, 1.53)	0.673		
Disagree	1			
Not a real medical illness				
Agree	0.86 (0.60, 1,24)	0.417		
Disagree	1			
Dangerous to others				
Agree	1.29 (0.76, 2.22)	0.349	1.27 (0.53, 3.02)	0.595
Disagree	1		1	
Best to avoid him				
Agree	1.10 (0.74, 1.56)	0.722	1.14 (0.62, 2.10)	0.674
Disagree	1		1	
Unpredictable				
Agree	1.66 (1.01, 2.71)	0.045*	1.28 (0.62, 2.64)	0.508
Disagree	1		1	
Would not tell anyone				
Agree	4.77 (3.40, 6.70)	<0.0001*	2.52 (1.50, 4.26)	0.001**
Disagree	1		1	

Note. OR, Odds ratio; CI, Confidence interval; *Variables significant at 0.25 from univariate analysis are entered into multivariate analysis;**Significant set at p- value < 0.05 after multivariate analysis; 1 indicates reference group; Hosmer-Lemeshow goodness-of-fit test chi square = 6.79 (df = 8), p = 0.559; No significant interaction or multicolinearity was present among variable entered into multivariate analysis.

Variable	Univariate logistic regression		Multivariate logistic regression	
	Crude OR (95% CI)	p-value	Adjusted OR (95%CI)	p-value
PERCEIVE STIGMA				
Could snap out of it				
Agree	0.82 (0.54, 1.24)	0.246*	0.83 (0.44, 1.57)	0.568
Disagree	1		1	
Sign of personal weakness				
Agree	1.21 (0.85, 1.73)	0.283	1.00 (0.61, 1.63)	0.994
Disagree	1		1	
Not a real medical illness				
Agree	0.87 (0.61, 1.26)	0.473		
Disagree	1			
Dangerous to others				
Agree	1.80 (1.29, 2.51)	0.001*	2.49 (1.36, 4.55)	0.003**
Disagree	1		1	
Best to avoid him				
Agree	1.35 (0.98, 1.85)	0.066*	1.11 (0.63, 1.97)	0.721
Disagree	1		1	
Unpredictable				
Agree	1.51 (0.97, 2.33)	0.066*	0.89 (0.45, 1.76)	0.739
Disagree	1		1	
Would not tell anyone				
Agree	2.19 (1.57, 3.07)	<0.0001*	1.12 (0.68, 1.85)	0.657
Disagree	1		1	

Note. OR, Odds ratio; CI, Confidence interval; *Variables significant at 0.25 from univariate analysis are entered into multivariate analysis;**Significant set at p- value < 0.05 after multivariate analysis; 1 indicates reference group; Hosmer-Lemeshow goodness-of-fit test chi square = 6.79 (df = 8), p = 0.559; No significant interaction or multicolinearity was present among variable entered into multivariate analysis.

Variable	Univariate logistic regression		Multivariate logistic regression	
	Crude OR (95% CI)	p-value	Adjusted OR (95%CI)	p-value
SOURCE OF HELP				
Family				
Yes	1		1	
No	4.12 (2.55, 6.66)	<0.0001*	2.19 (1.02, 4.69)	0.044**
Counsellor/Psychiatrist				
Yes	1		1	
No	1.54 (1.10, 2.17)	0.013*	1.61 (0.92, 2.81)	0.094
Teacher				
Yes	1		1	
No	1.78 (1.28, 2.47)	0.001*	0.78 (0.45, 1.33)	0.352
Friend				
Yes	1			
No	1.19 (0.84, 1.68)	0.325		

Note. OR, Odds ratio; CI, Confidence interval; *Variables significant at 0.25 from univariate analysis are entered into multivariate analysis;**Significant set at p- value < 0.05 after multivariate analysis; 1 indicates reference group; Hosmer-Lemeshow goodness-of-fit test chi square = 6.79 (df = 8), p = 0.559; No significant interaction or multicolinearity was present among variable entered into multivariate analysis.

Variable	Univariate logistic regression		Multivariate logistic regression	
	Crude OR (95% CI)	p-value	Adjusted OR (95%CI)	p-value
BARRIERS TO HELP SEEKING				
Not enough money				
Yes	1.94 (1.41, 2.68)	<0.0001*	1.06 (0.65, 1.73)	0.827
No	1		1	
Person might feel negatively about you				
Yes	3.12 (2.09, 4.68)	<0.0001*	1.49 (0.82, 2.70)	0.190
No	1		1	
Person might give wrong information				
Yes	1.83 (1.25, 2.69)	0.002*	0.74 (0.41, 1.33)	0.316
No	1		1	
Worried what others might think of you				
Yes	3.36 (2.37, 4.76)	<0.0001*	1.67 (1.02, 2.75)	0.041**
No	1		1	
The person or service is far				
Yes	1.54 (1.09, 2.16)	0.013*	1.12 (0.66, 1.91)	0.682
No	1		1	
Difficult to get appointment				
Yes	1.87 (1.33, 2.62)	<0.0001*	1.85 (1.07, 3.19)	0.027**
No	1		1	
Worried about the negative effects of treatment				
Yes	1.38 (1.00, 1.90)	0.050*	1.05 (0.63, 1.74)	0.852
No	1		1	
Not liking the treatment				
Yes	1.59 (1.13, 2.22)	0.007*	0.78 (0.47, 1.31)	0.349
No	1		1	
Feeling that nothing can help				
Yes	3.63 (2.61, 5.07)	<0.0001*	1.66 (1.01, 2.70)	0.044**
No	1		1	

Variable	Univariate logistic regression		Multivariate logistic regression	
	Crude OR (95% CI)	p-value	Adjusted OR (95%CI)	p-value
Waiting time for appointment				
Yes	1.06 (0.75, 1.51)	0.737	0.90 (0.54, 1.51)	0.697
No	1		1	
Too embarrassed/shy				
Yes	3.41 (2.46, 4.72)	<0.0001*	1.50 (0.94, 2.39)	0.091
No	1		1	

Note. OR, Odds ratio; CI, Confidence interval; *Variables significant at 0.25 from univariate analysis are entered into multivariate analysis;**Significant set at p- value < 0.05 after multivariate analysis; 1 indicates reference group; Hosmer-Lemeshow goodness-of-fit test chi square = 6.79 (df = 8), p = 0.559; No significant interaction or multicolinearity was present among variable entered into multivariate analysis.