Positive health practices and depressive symptoms among high school adolescents in Oman

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ABSTRACT

Introduction: The study aimed to investigate the association of health practices and depressive symptoms among high school adolescents in a national representative sample of 5,409 students in Oman.

Methods: Depressive symptoms were screened in 2004 through the application of the self-report 27-item Child Depression Inventory. Health practices scale comprised a simple sum of five healthy practices, namely: sleeping seven to eight hours at night, having breakfast daily, not eating between meals, not smoking the month prior to the study, and doing physical activities more than once per week apart from attending physical education classes in school.

Results: Sequential logistic regression models were run to test for the change in the odds-ratio (OR) of having depressive illness with a one point increase in the healthy practices scale, after adjustment for other risk factors of depression. Health practices remained having a significant protective effect on depression (OR is 0.72, 95 percent confidence interval is 0.64-0.80) even after adjustment to other significant covariates in the last model, such as history of chronic medical or mental illness diagnosed by a doctor, high scoring in chance health locus of control (HLC), low scoring in internal HLC, poor relationships with social contacts, and physical abuse during childhood or adolescence.

Conclusion: Findings support the protective effects of positive health practices on adolescents' depression.

Keywords: adolescents, depression, health practices

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INTRODUCTION

Health-related behaviour in early life influences later risks for lifestyle-related disorders. It is therefore important to investigate the health behaviour among young people[1]. It makes sense to focus on them in a study of associations between health and different health habits in order to improve health promotion activities targeting this group. It would also help to develop health education initiatives targeting students, which necessitates having a detailed knowledge about the health of students, their health-related behaviours, and factors that influence these behaviours. Students comprise a homogeneous and accessible population, which is also relatively healthy. This minimises the bias related to the influence of illness on health behaviours[2].

For much of the 20th century, depression was viewed as a malady to which children were not susceptible. In recent years, this view has given way to an understanding that child and adolescent depression not only exist, but also constitute an insidious and major public health problem. Depressive symptoms in children can be subtle and varied. The diagnosis in adolescents is often complicated by behavioural manifestations associated with hormonal changes but evidence suggests that secondary prevention can significantly reduce future psychosocial problems[3]. Adolescents' depression was proven to be associated with several health risk behaviours, including tobacco use[4] and obesity[5,6]. The 27-item Children Depression Inventory (CDI)[7] which covers an array of overt symptoms of child and adolescent depression, such as sadness, suicidal ideation, sleep and appetite disturbance, is a reliable tool to screen for depressive symptoms among adolescents. The cut-off score of 20 is suggested for screening in a general population, such as in a school setting, in which the prevalence of depression is likely to be low[8]. The CDI is reliable and used in Arab countries, including Oman[9-11].

Health locus of control (HLC) is one of the most widely-measured parameters of health belief for the planning of health education programmes[12].

The Multidimensional Health Locus of Control (MHLC) scale, developed by Wallston and Wallston in 1978[13], contains three subscales: Internal HLC (IHLC), Chance HLC (CHLC), and Powerful Others HLC (PHLC). CHLC and/or PHLC are classified as "external" belief and IHLC as "internal" belief[13]. Correlates of depression differ according to the country and culture. Depression prevention programmes tailored for each country has to take such differences into consideration[10]. Despite some studies proving the protective effect of high internality on adolescents depression[14], other research on the association between HLC and depression in chronic illness has produced contradictory findings[15]. That could be explained, perhaps, by the failure to consider other contextual variables such as demographical, social relationships with contacts or healthy practices.

The protective effect of good social relationships with others on adolescent depression has been proven in a previous study in Oman[9]. Moreover, low self-esteem and the male gender were the strongest predictors of the adolescents' risky behaviours in Oman[16]. Yet, the protective effect of physical activity on depression is controversial. Some studies did not prove it[17-19], while other studies did[20-22]. This study aimed to investigate the association of health practices and depressive symptoms among high school adolescents in a national representative sample of 5,409 students in Oman.

METHODS
This study is an in-depth analysis of a general study accepted for publication[11]. The sample size was determined after calculation with Epi-Info version 6 (USD Inc, Stone Mountain, GA, USA) for each gender separately, with the assumption of a prevalence rate of 1% of depressive disorders among adolescents and a confidence interval of 99%. Accordingly, 5,616 students (2,885 male adolescents and 2,731 female adolescents), were initially randomly selected. This constituted about 5% of the 111,849 secondary school students for the academic year 2004 from 43 wilayats (73% of the 59 wilayats [districts] in Oman). Of these, 2,739 male adolescents and 2,670 female adolescents, giving a total of 5,409 students, were screened and entered in the statistical analysis. Hence, the response rate was 96.31% for the overall sample; 95% for boys and 97% for girls.

The survey adopted a multi-stage, stratified random sampling design. All the regions of the Sultanate were chosen, and as the first stage, a sample for each gender was selected in proportional allocation to the total number of adolescent students, for each gender. Then, in each region, the male and female sub-samples were distributed in proportional allocation to the secondary school adolescents' population size in each of the five grades available in Omani secondary schools (I, II Art and II Science, III Art and III Science). In the next stage, one or more schools were chosen randomly from each region, and then from each school, one or more classes were randomly selected in the third stage to cover the number of adolescents needed for the sample. The total sample was subjected to the 27-item CDI and a questionnaire including demographical data, HLC and other associated factors with depression.

Details of the questionnaire and measurements are as follows:

1. A self-report questionnaire was designed for the studied sample of secondary school students. It included demographic data: age, sex, parental level of education, and associated factors with adolescent depression, such as history of physical abuse during childhood or adolescence. Also, self-reporting of chronic physical illnesses (e.g. diabetes mellitus, cardiovascular diseases, bronchial asthma, genetic blood disorders, chronic renal diseases, polio, neoplasia, chronic rheumatic diseases) and/or mental disorders (e.g. epilepsy, depression, anxiety, schizophrenia) diagnosed by a doctor were included.

2. Social relationships with their contacts, namely, relationship with father, mother, siblings, friends, and school teachers, were enquired through an index of 25 items (five questions for each of the aforementioned five categories of contacts) giving an aggregate score ranging from 0-25 where 0 represented having the worst relationships and 25 represented excellent relationships with the subject's social contacts.

3. The questionnaire also included a group of questions on adolescents' healthy practices, namely: sleeping habits and hours of sleep, eating breakfast daily, eating between meals, smoking, and physical activities. These questions were based on the Alameda County Study adapted from Takakura and Sakihara[23]. Each of the following responses was considered a positive health practice: sleeping seven to eight hours/night; eating breakfast daily; not eating between meals; not smoking the month prior to the study; and doing physical activities more than once per week, apart from physical education classes in school. Health practices index comprised the sum of the total number of positive health practices, a score ranging from 0-5. The score 0 represented doing none of the aforementioned positive health practices and 5 represented doing all five practices.

4. The students were also asked about their HLC, whether internal or chance. IHLC denoted that the student believed that his health is the outcome of his deeds, while CHLC denoted that he believed that chance played a great role for him to be or to stay healthy. The MHLC Form A, developed by Wallston and Wallston[13] in 1978, contains 18 questions classified into three subscales: IHLC, CHLC, and PHLC. The first two subscales, IHLC and CHLC, were translated into Arabic by the author who also calculated Cronbach's Alfa to assess the internal consistency as reliability in a pilot study. Both subscales showed accepted levels of internal consistency, i.e. above 0.4 (0.5111 and 0.4636 for the two subscales respectively). Each subscale contained six questions and for each question, study participants chose one out of six answers ranging from "strongly agree = 6" to "strongly disagree = 1". The score for each subscale ranged from 6-36[13].

5. The Arabic translation of the 27-item CDI[7] was used by Afifi in more than one study[9,10,24] and covered an array of overt symptoms of child and adolescent depression, such as sadness, suicidal ideation, sleep and appetite disturbances. Each of the 27 items of the inventory assessed one symptom by presenting three choices ranging from 0-2 in the direction of increasing psychopathology and the total score ranges from 0 to 54. The mean score (SD) of the CDI was 13.16 (6.69). Those who scored 20 and above were considered as having at least mild depressive symptoms. The cut-off score of 20 is suggested for screening in a general population, such as in a school setting, in which the prevalence of depression is likely to be low. The CDI is reliable and used in Arab countries[8], including Oman[9,10]. The Cronbach's Alpha reliability was 0.8 in the current study, and it took each student around 40-50 minutes to fill the whole questionnaire (around a class period).

Three days of training was tailored to the school health doctors who undertook the screening process. In addition, a medical officer (regional coordinator) was recruited in each health region of the Sultanate to take care of the administration and logistics of the survey and to assure the implementation of all survey phases was according to the designed plan. During training, a pilot was conducted by the school health doctors on 400 secondary school students from both sexes in two randomly-selected secondary schools of different gender (not included in the study sample) in Muscat.

Data coding, entry and management was done using the Epi-Info statistical programme followed by data analysis using the Statistical Package for Social Sciences (SPSS) for Windows version 9.0 (SPSS Inc, Chicago, IL, USA). Data were given as counts, percentages and means. Group means were compared using ANOVA, and the chi-square test examined the distribution of data using the likelihood ratio. After doing bivariate analysis between the dependant variable and its predictors, all variables were then entered into logistic regression models to get the most significant variables adjusted for each other. The dependant dichotomous variable (normal = 0, depressed = 1) was having depressive symptoms of CDI$\geq$20 whereas the independent (predictor or explanatory) variables comprised dichotomous, categorical or continuous variables. The odds-ratio which showed the change in the odds of dependent variable(s) when the independent variable changed from 0 to 1 (in case of binary variables) or the next category or score (in case of categorical or continuous variables) was adjusted for age, sex, and the other variables in the model. p-value $\leq$0.05 was considered significant in all statistical tests. Confidentiality was maintained as no direct or indirect identification was used. Verbal consent was obtained from the adolescent participants as well as the school headmasters. Pre-testing of the questionnaire was conducted on 400 students of both sexes before running the studies to validate the used tools.

RESULTS

The age of the study group ranged from 14 to 20 years, with three-quarters of the sample aged 16-18 years. 50.6% were boys. The majority had fathers or mothers with less than secondary education (84% and 92%, respectively). Less than 8% of the studied sample reported having a chronic physical illness diagnosed by a doctor, e.g. cardiovascular, chronic asthmatic bronchitis, diabetes mellitus, genetic blood disorders, while 2.3% reported a mental disorder diagnosed by a doctor. 43% of the sample reported having seven to eight hours of night sleep, 60% took a regular breakfast, 8.3% reported not eating between meals, 95.5% did not smoke in the month prior to the study, and 33.7% did physical exercises more than once weekly outside their school premises.

The mean (SD) score of health practice index was 2.4 (0.94), ranging from 0-5. Those with no positive health activities constituted 0.9% of the sample, 16.3% with one health practice, 37.3% with two practices, 32.9% with three practices, 12.1% with four practices and 0.5% with all the five positive health

practices. The mean (SD) score of social relationship index was 19.3 (3.77). The mean (SD) score of IHLC was 24.33 (5.12), while the mean (SD) score of CHLC was 22.25 (5.06). Around 25% of the sample were subjected to physical abuse by their parents or guardians, and 7.5% of the sample were also physically abused during their adolescence. 17% of the sample had at least mild depressive symptoms.

Table I shows that poor health practices,

Table I. Significant predictors of adolescent's depression in a bivariate analysis.

Variable	Overall sample (n=5,409[a])				
	Normal		Depressed		
	n	%	n	%	Total
Sex (n=5,409)					
Boys	2,332	85.3	401	14.7	2,733
Girls	2,136	80.6	515	19.4	2,651
Total	4,468	83.0	916	17.0	5,384
Father's education					
Illiterate	1,008	81.8	225	18.2	1,233
Read and write	1,126	84.9	200	15.1	1,326
Primary	549	84.6	100	15.4	649
Intermediate	575	84.4	106	15.6	681
High school	248	76.5	76	23.5	324
Diploma	92	82.9	19	17.1	111
University and above	246	82.8	51	17.2	297
Total	3,844	93.2	777	16.8	4,621
History of mental illness					
No	4,392	83.5	867	16.5	5,259
Yes	76	60.8	49	39.2	125
Total	4,468	83	916	17	5,384
History of chronic physical illness					
No	4,168	83.8	805	16.2	4,973
Yes	300	73	111	27	411
Total	4,468	83	916	17	5,384
Physical abuse during childhood					
No	3,495	87.2	515	12.8	4,010
Yes, without injury	666	75.3	218	24.7	884
Yes, with mild injury	198	59.3	136	40.7	334
Yes, need medical advice	66	64.1	37	35.9	103
Total	4,425	83	906	17	5,331
Physical abuse during adolescence					
No	4,132	85.2	717	14.8	4,849
Yes, without injury	143	62.4	86	37.6	229
Yes, with mild injury	52	43.7	67	56.3	119
Yes, need medical advice	23	46.7	26	53.1	49
Total	4,350	82.9	896	17.1	5,246
Social relationship: n		4,412		899	5,311
mean (SD)		20.8 (3.11)		15.4 (4.31)	19.3 (3.77)
IHLC: n		4,448		910	5,358
mean (SD)		24.4 (5.01)		23.9 (5.62)	24.3 (5.12)
CHLC: n		4,449		907	5,356
mean (SD)		22.0 (4.95)		23.3 (5.48)	22.3 (5.07)
Positive health practices: n		4,206		865	5,071
mean (SD)		2.5 (0.94)		2.0 (0.88)	2.4 (0.94)

[a] Most of the variables had missing values and its "n" does not sum to the sample size of 5,409.

female sex, higher level of father's education, poor social relations, low score of IHLC, high score of CHLC, self-reported mental or chronic medical illness, and history of abuse during childhood or adolescence, were significantly associated with having at least mild depressive symptoms. Only age and mother's education were not associated. All the 12 independent variables were entered into a logistic regression model in a sequential way, shown in Table II. The odds of having depressive illness due to health practices remained significant in all the six models. The other significant factors in the last logistic model were either risk factors (high IHLC, history of chronic medical or mental illness, history of child or adolescents' abuse) or protective factors (high CHLC, good social relationships). Age, sex and parental education were excluded in early models. This finding proved the protective effect of good health practices on depression, even after adjusting for other covariates.

Table II. Sequential logistic regression models showing relationships between health practices and adolescents' depressive symptoms.

		Health practices	
Models and covariates		OR[a]	95% CI[b]
I.	Age, sex	0.60	0.55-0.66
2.	Model 1 + father's education + mother's education	0.58	0.53-0.64
3.	Model 2 + social relationships	0.72	0.64-0.80
4.	Model 3 + CHLC + IHLC	0.72	0.65-0.80
5.	Model 4 + self-reporting of diagnosed chronic medical illness + self-reporting of diagnosed chronic mental illness	0.71	0.64-0.80
6.	Model 5 + history of physical abuse during childhood + history of physical abuse during adolescence	0.71	0.64-0.80

[a] Odds-ratio (OR) represents the approximate relative likelihood of being depressed associated with a one point increase in the healthy practices scale.

[b] 95% CI is the 95% confidence interval of OR.

DISCUSSION

The current study spotlights the rate and correlates of adolescents' depression in Oman. It showed that 17% of the studied sample had depressive symptoms, denoting that adolescents' depression is a public health problem in Oman. Adolescent depression may be manifested as, or comorbid with, conduct disorders[25] or eating disorders[26].

Alcoholism, drug addiction or physical complaints may mask depression[27]. Therefore, depression remains widely undiagnosed and untreated in the adolescent population[28]. It also shows the protective effect of positive health practices against depression.

Despite other studies revealing that depression in children and adolescents increases in frequency with age, this study did not show the same results[29]. Female gender preponderance was seen in other studies as well as in our study[30]. However, in the multivariate analysis, female gender was no longer a significant predictor. It could be explained either by a weak or lack of association of gender with depression[10], or variables in the model mediated to gender difference in adolescent depression. Adolescents who were oriented toward CHLC were more likely to report depressive symptoms in the current study either in the bivariate or multivariate analysis. The same findings were seen in other studies[14]. High CHLC scores significantly increased the risk for behavioural problems in general[31]. Afifi also proved that history of physical abuse and externality are both risk factors for depression[14]. Six different adolescent reactions to abuse were identified: acting-out, depression, generalised anxiety, extreme adolescent adjustment, emotional-thought disturbance, and helplessness-dependency[32].

Finally, the negative association of depressive symptoms with positive healthy practices and good social relationships in our study have also been proven in other studies[23]. It seems that positive healthy practices could have a buffering effect on depressive symptoms[23]. Adolescents with more positive practices are less likely to report depressive symptoms[33]. Simonsick, using almost the same measure of health practices, found a strong relationship between poor health habits and risk of depressed mood[34]. Among young adolescents, Yarcheski et al[35,36] proved the negative correlation between scores of depression and positive health practices[35] and the positive correlation between the Rosenberg Self-esteem Scale and scores for positive health practices[36]. Poor dietary habits in the form of eating between meals and not taking breakfast regularly correlated with physical inactivity, leading to obesity.

Recent studies showed the association between obesity and depression in adolescence[37-40]. Strawbridge et al[41] found that even with adjustments for age, sex, ethnicity, financial strain, chronic conditions and disability, greater physical activity was protective for depression. After adjusting for chronic conditions, his study supported the mechanism of the indirect effect of

physical inactivity on depression by causing chronic conditions, such as diabetes and heart diseases, in old age[42]. The proposed mechanism by which physical activity might reduce the rate of depression is the increased levels of two types of brain neurotransmitters following exercise: monoamines and endorphins[43]. Other plausible mechanisms include improved fitness and increased self-esteem as a result of greater activity[44]. The strong positive association between smoking and depression was proven in other studies[45]. Depressed adolescents are more likely to begin smoking, to smoke more and to continue smoking as young adults. Smokers with mild or major depression find it hard to quit smoking[46].

To the best of my knowledge, the current study is the first study to investigate the association of adolescents' depression with good health practices in the Gulf countries. The dearth of research on adolescents' depression in the Arab world published in PubMed-indexed journals, and the diversity in tools used to screen depressive symptoms and its correlates, are two important limitations in our study. Adding to these limitations, self-reported questionnaires used might also elicit inflated or false responses, especially in such a sensitive age group. However, self-reported questionnaires are easy to apply, and it was logistically difficult to conduct structured interviews for such a large sample. The last limitation is the difficulty to show how representative this students' sample is in Oman in relation to the Omani adolescents. Although education is universal in Oman, the possibility of dropping out should always be accounted for. Utilisation of the current study findings by taking the protective and risk factors of adolescents' depression into consideration in a future prevention programme, as well as strengthening the mental health component of school health programme, are recommended.

ACKNOWLEDGEMENTS

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