Depression in adolescents: gender differences in Oman and Egypt

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الاكتئاب لدى المراهقين: الفروق بين الجنسين في عُمان ومصر

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الخلاصة: في إطار هذه الدراسة التي استهدفت التعرُّف على الفروق بين المراهقين والمراهقات، تم تحديد معدلات الاكتئاب والعوامل المرتبطة به في عيِّنتين مختلفتين من المراهقين من طلاب المدارس الثانوية، شملت العينة الأولى 552 من الطلاب في منطقة جنوب الشرقية، في عُمان، وشملت الثانية 1577 من الطلاب في الإسكندرية، بمصر. وتم استخدام نماذج التحوُّف اللوجستي العديد المتغيرات لتقصِّي الترابُط بالاكتئاب. وبيَّنت الدراسة أن معدل ظهور أعراض الاكتئاب بين الفتيات في الإسكندرية يبلغ ضعفَيْ مثيله بين الذكور. أما في عُمان، فلم يلاحظ فرق مهم بين الفئتين. كما بينت الدراسة أن سوابق التعرض لإساءة المعاملة في مرحلة المراهقة تعتبر أحد العوامل المنبئة بحدوث الاكتئاب في معظم النماذج. وتؤثر العلاقة السيئة بين الوالدين على الفتيات أكثر مما تؤثر على الفتيان في عينة الإسكندرية وفي المجموعة المندمجة. وخلصت الدراسة إلى وجود فروق بين الجنسين في معدلات الاكتئاب أو في الترابُط به، ولكنها قد تختلف من بلد لآخر.

ABSTRACT To investigate the differences between adolescent boys and girls, the rates of depression and associated factors were determined for secondary school adolescents in 2 different samples, 552 in South Sharqiya, Oman, and 1577 in Alexandria, Egypt. Multivariate logistic regression models were used to investigate the correlates of depression. In Alexandria, the rate of having depressive symptoms in girls was almost double that in boys. In Oman, however, there was no significant difference. History of abuse during adolescence predicted depression in almost all the models. Poor relationship with parents affected girls more than boys in Alexandria and in the merged sample. Gender differences in rates or correlates of depression exist but may differ for different countries.

La dépression chez les adolescents : différences sexospécifiques à Oman et en Égypte

RÉSUMÉ Afin d'examiner les différences entre adolescents et adolescentes, on a établi les taux de dépression et les facteurs associés pour des adolescents d'écoles secondaires dans 2 échantillons différents, 552 à Sharqiya Sud (Oman) et 1577 à Alexandrie (Égypte). Des modèles de régression logistique multivariée ont été utilisés pour étudier les corrélats de la dépression. À Alexandrie, le taux de symptômes dépressifs chez les filles était presque le double de celui des garçons. À Oman, toutefois, il n'y avait pas de différence significative. Les antécédents de mauvais traitements durant l'adolescence permettaient de prédire la dépression dans presque tous les modèles. Les mauvaises relations avec les parents affectaient davantage les filles que les garçons à Alexandrie et dans l'échantillon fusionné. Il existe des différences sexospécifiques dans les taux ou les corrélats de la dépression mais elles peuvent varier d'un pays à l'autre.

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Introduction

Gender differences in prevalence of mental disorders vary across age groups. Conduct disorder is the commonest psychiatric disorder in childhood; 3 times as many boys as girls are affected [*1*]. During adolescence, girls have a higher prevalence of depression and eating disorders, and engage more in suicidal ideation and suicide attempts than boys, who are more prone to engage in high-risk behaviours and are more likely to commit suicide [*2–4*]. In adulthood, women have a higher prevalence of most affective disorders and non-affective psychoses and men have higher rates of substance use disorders and antisocial personality disorder [*5,6*].

Unfortunately, "gender" is increasingly used inappropriately as a substitute for "sex", particularly in the biomedical literature, a tendency which has created confusion. Sex denotes biologically determined characteristics, while gender indicates culturally and socially shaped variations between men and women [*7*], and is related to how we are perceived and expected to think and act as women and men because of the way society is organized, not because of biological differences [*8*].

Gender-based differences may be biomedical (genetic, hormonal, anatomic, physiological), psychosocial (personality, coping, symptom reporting), epidemiological (population-based risk factors) or even global. This last covers large-scale cultural, social, economic and political processes that ultimately produce differential health risks for women and men [*9*].

Gender analysis improves understanding of the epidemiology of health problems, detection and treatment of health problems in underreported groups and relevance of public health services, and also increases the potential for greater public participation in health [*7*]. Gender is a critical determinant of mental health and mental illness; gender differences in mental disorders extend beyond differences in the rates of various disorders and their differential time of onset or course, and include a number of factors that can affect risk or susceptibility, diagnosis, treatment and adjustment to mental disorder [*10*].

Gender differences in adult depression can also be seen in adolescents: girls are at least twice as likely to develop depressive disorders as adolescent boys [*11*]. Age at onset of depression and bipolar disorder is similar in males and females [*12*]; adolescent girls have, however, been found to be significantly more likely to experience low and moderate levels of depression than adolescent boys [*13,14*].

The aim of this work was to analyse the differences between adolescent boys and girls in the rates of depression and associated factors that increase risk of depression in 2 sets of data, from Alexandria, Egypt and South Sharqiya Region, Oman.

Methods

Study subjects

A systematic, stratified, random sample technique was used to select students of both sexes from 18 secondary schools in South Sharqiya Region, Oman in a cross sectional school-based study carried out in 1998 [*15*]. Using *Epi-Info Statcalc*, sample size was determined at 500 (N = 6071) at 99.99% confidence. There were no refusals to participate.

In the second set of data, using a similar sampling technique, 1577 adolescents were selected from 12 secondary schools representing the 6 districts of Alexandria, Egypt in school-based study carried out in 1996 [*16*].

Study tools

In the 2 studies, a self-report questionnaire was used to collect demographic and personal data and information on correlates of depression such as age, sex, birth order, number of family members, number of rooms in the respondents' residence, history of organic illness in the year prior to the study, cigarette smoking, relationship of the respondent with parents and teachers, history of physical abuse during childhood and family history of organic illness or mental disorder. In addition, the Arabic version of the 27-item Children's Depression Inventory [*17*], which covers an array of depressive symptomatology, was used. This is a self-report instrument that asks about symptoms of depression such as sleep disturbance, appetite loss, suicidal thoughts and general dysphoria that the respondent had experienced during the preceding 2 weeks. Each item consists of 3 brief statements that describe a range of endorsement from normal response to indications of moderate depressive symptoms or severe depressive symptoms. The items are scored 0, 1 and 2 respectively, yielding a range from 0 to 54. The higher the total score, the higher the level of depressive symptoms. The cut-off value for depression in both groups was a score above the 90th percentile, i.e. the upper tenth of the scores. The inventory can also be used to define caseness, with adolescents scoring above the 90th percentile identified as depressed cases. The inventory's test-retest reliability was 0.9.

The Arabic Social Class Scale, which depends on the parents' education level, parents' occupation and crowding index (number of family members divided by number of closed rooms in their accommodation) of the study subjects was also used in the 2 sets of data [*18*].

Data processing and statistical analysis

Data coding, entry and management was done using *Epi-Info* statistical program followed by data analysis using *SPSS* for Windows, version 6. Logistic regression models for each data set were constructed for the whole sample, the male sub-sample and the female sub-sample to compare between factors associated with depression. Then, the 2 data sets were combined (merged) and logistic regression models were also constructed for the new merged sample as well as for each sex separately. The dependent binary variable (output variable) was depression (normal = 0, depressed = 1); the independent (or explanatory) variables included dichotomous variables, e.g. physical abuse during childhood (no = 1, yes = 2), categorical variables, e.g. adolescent–parents relationship (good = 1, not good = 2, very bad = 3) and continuous variables, e.g. social class score (0–25). The odds ratio of each variable significantly associated with depression was adjusted for age, sex (only for the whole sample) and social class as well as the other variables in the model to adjust for confounding between variables. The odds ratio shows the change in the odds of depression when the independent variable changed from 1 to 2 or the next category. P-value < 0.05 was considered significant.

Ethical issues and pretest

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. Pretesting of the questionnaire was conducted on 100 students of both sexes before running the studies.

Results

In Alexandria, mean age [standard deviation (SD)] of the study group was 15.82 (1.31) years; 49.8% were boys. Girls (12.8%) were significantly more likely to be depressed than boys (7.0%) using the same cut-off score at > 90th percentile (likelihood $\chi^2 = 14.935$, $P < 0.001$). The difference between the 2 sexes was manifested in the correlates of depression as well as in rates mentioned above. Female sex, older age, poor relationship with parents, good relationship with teachers, history of physical abuse during childhood and personal history of organic illness were correlates of depression in the whole sample. Comparing the predictors for boys and girls, 2 variables, relationship with teachers and personal history of organic illness were associated with depression for each sex and for the whole sample. For girls, age, relationship with parents and current cigarette smoking were exclusive predictors while history of physical abuse was exclusive for boys. The odds ratios and confidence intervals of the significant predicting variables are shown in Table 1.

The mean age (SD) of the Omani participants was 16.99 (0.99) years; 48.0% were boys. Table 2 shows the predicting variables of depression among Omani adolescents. Boys (10.6%) were more likely to be depressed than girls (7.7%) (likelihood $\chi^2 = 0.236$, $P = 0.240$). Good relationship with teachers, history of physical abuse, family history of mental disorder and personal history of organic illness were correlates of depression for the whole sample. Comparing the predictors of depression for boys and girls, history of physical abuse was the only common predictor for both sexes. For girls, age, poor relationship with teacher and fa-mily history of mental disorder were exclusively predictive whereas current cigarette smoking was exclusive for boys.

The next step was to merge the 2 sets of data and run logistic regression models as above but controlling also for the country (Oman = 1, Egypt = 2). For the overall sample almost all the variables predicted depression except family history of organic illness and country of data set, denoting that neither of the 2 countries were more likely to have more depressed adolescents in their data set controlling for other confounders. Physical abuse, personal history of organic illness, family history of mental disorders and good relationship with teachers were common correlates for both sexes. For males, country was significantly associated with adolescent depression; according to the odds ratios, boys in Alexandria were less likely to be depressed than Omani boys. Age, poor relationship with parents and smoking were exclusively associated with depression among females (Table 3).

Discussion

Distinguishing biological and social factors while exploring their interactions, and being sensitive to how gender inequality affects health outcomes is what we mean by a gender approach to health. It provides guidance for the identification of appropriate responses from the health care system and from public policy. The current study indicates that male and female adolescents share common social risks correlated to their depressive symptomatology. It also demonstrates that each sex has its own exclusive risk factors and gender differences in rates and that correlates of depression differ also by country and culture. This occurs because biology never acts alone to determine health inequities. Social determinants, including gender, exacerbate biological vulnerabilities and interact in additive or multiplicative way with other social markers [*19*].

Table 1 **Odds ratios for predictors of depression in male and female adolescents in Alexandria by logistic regression**

Variable	All		Males		Females	
	OR	95% CI	OR	95% CI	OR	95% CI
Relations with parents						
Good = 1	1		NS		1	
Poor = 2	2.21	1.49–3.30	NS		3.19	1.88–5.38
Very bad = 3	4.49	2.29–8.80	NS		10.05	4.20–24.06
Physical abuse						
No = 1	1		1		NS	
Yes = 2	2.13	1.45–3.13	3.06	1.71–5.47	NS	
Family history of organic disease						
No = 1	NS		NS		NS	
Yes = 2	NS		NS		NS	
Personal history of organic disease						
No = 1	1		1		1	
Yes = 2	4.11	2.5–6.74	3.60	1.63–8.12	5.33	2.81–10.08
Family history of mental disease						
No = 1	NS		NS		NS	
Yes = 2	NS		NS		NS	
Relations with teacher						
Good = 1	1		1		1	
Poor = 2	0.23	0.11–0.47	0.21	0.08–0.56	0.22	0.07–0.66
Very bad = 3	0.35	0.18–0.67	0.31	0.13–0.74	0.36	0.13–1.00
Cigarette smoking						
No = 1	NS		NS		1	
Yes = 2	NS		NS		2.2	1.22–4.02
Age (years)						
14 –	1		NS		1	
15 –	1.7	0.88–3.30	NS		2.24	0.89–5.65
16 –	2.02	1.01–4.05	NS		2.53	0.97–6.57
17 –	2.33	1.20–4.53	NS		3.86	1.58–9.53
18 –	2.54	1.16–5.56	NS		3.81	1.24–11.66
19+	4.37	1.56–12.23	NS		8.78	1.64–46.95
Sex						
Male = 1	1		–		–	
Female = 2	1.79	1.22–2.61	–		–	
Birth order (1–9)	NS		NS		NS	
Social class score (0–25)	NS		NS		NS	

OR = odds ratio.
CI = confidence interval.
NS = not significant.
– not applicable.

Table 2 **Odds ratios for predictors of depression in male and female adolescents in Oman by logistic regression**

Variable	All		Males		Females	
	OR	95% CI	OR	95% CI	OR	95% CI
Relations with family						
Good = 1	NS		NS		NS	
Poor = 2	NS		NS		NS	
Very bad = 3	NS		NS		NS	
Physical abuse						
No = 1	1		1		1	
Yes = 2	5.18	2.63–10.22	3.96	1.64–9.56	11.56	3.41–39.17
Family history of organic disease						
No = 1	NS		NS		NS	
Yes = 2	NS		NS		NS	
Personal history of organic disease						
No = 1	1		NS		NS	
Yes = 2	3.35	1.26–8.93	NS		NS	
Family history of mental disease						
No = 1	1		NS		1	
Yes = 2	5.16	2.07–12.84	NS		22.04	5.04–96.38
Relations with teacher						
Good = 1	1		NS		1	
Poor = 2	0.17	0.02–1.33	NS		13.18[a]	0.0–165e[38]
Very bad = 3	0.58	0.07–4.44	NS		57.10[a]	0.0–165e[38]
Cigarette smoking						
No = 1	NS		1		NS	
Yes = 2	NS		2.88	1.10–7.55	NS	
Age (years)						
14 –	NS		NS		NS	
15 –	NS		NS		NS	
16 –	NS		NS		NS	
17 –	NS		NS		NS	
18 –	NS		NS		NS	
19+	NS		NS		NS	
Sex						
Male = 1	NS		–		–	
Female = 2	NS		–		–	
Birth order (1–9)	NS		NS		NS	
Social class score (0–25)	NS		NS		NS	

OR = odds ratio.
CI = confidence interval.
NS = not significant.
– not applicable.
[a]*Not significant: CI starts from 0.0.*

Table 3 **Odds ratios for predictors of depression in male and female adolescents in Oman and Alexandria by logistic regression, merged data**

Variable	All		Males		Females	
	OR	95% CI	OR	95% CI	OR	95% CI
Relations with family						
Good = 1	1		NS		1	
Poor = 2	1.83	1.29–2.58	NS		2.28	1.43–3.63
Very bad = 3	2.64	1.46–4.79	NS		4.31	1.92–9.66
Physical abuse						
No = 1	1		1		1	
Yes = 2	2.57	1.85–3.58	3.21	1.98–5.22	2.29	1.47–3.58
Family history of organic disease						
No = 1	NS		NS		NS	
Yes = 2	NS		NS		NS	
Personal history of organic disease						
No = 1	1		1		1	
Yes = 2	3.66	2.37–5.65	3.19	1.65–6.11	4.35	2.41–7.88
Family history of mental disease						
No = 1	1		1		1	
Yes = 2	2.11	1.30–3.40	2.29	1.05–5.04	1.97	1.05–3.70
Relations with teacher						
Good = 1	1		1		1	
Poor = 2	0.22	0.11–0.42	0.19	0.09–0.39	0.19	0.07–0.55
Very bad = 3	0.41	0.22–0.75	0.36	0.16–0.76	0.43	0.16–1.18
Cigarette smoking						
No = 1	1		NS		1	
Yes = 2	1.69	1.120–2.56	NS		2.16	1.20–3.88
Age (years)						
14 –	1		NS		1	
15 –	1.73	0.89–3.34	NS		2.5	0.98–6.39
16 –	2.04	1.05–3.97	NS		2.81	1.10–7.19
17 –	2.21	1.16–4.2	NS		3.44	1.38–8.55
18 –	3.12	1.57–6.22	NS		4.73	1.90–11.77
19+	2.88	1.15–7.17	NS		4.43	1.01–19.41
Sex						
Male = 1	1		–		–	
Female = 2	1.47	1.06–2.05	–		–	
Birth order (1–9)	NS		NS		NS	
Social class score (0–25)	NS		NS		NS	
Country						
Oman = 1	NS		1		NS	
Egypt = 2	NS		0.52	0.34–0.80	NS	

OR = odds ratio.
CI = confidence interval.
NS = not significant.
– not applicable.

In the current study, adolescent boys in the Alexandria set of data were significantly less likely to be depressed than girls. This is consistent with the findings of Nolen–Hoeksema et al. Women experience depression more often than men, whether depression is indexed by levels of depressive symptoms or by diagnosed unipolar depressive disorders [*20*]. This gender difference in depressive symptoms appears to emerge in early adolescence and then remain throughout adult life [*21*]. Kandel and Davies explained this by masked depression and increased delinquency among boys compared with girls [*22*].

In the Omani set of data, boys were unexpectedly (but non-significantly) more likely to have depressive symptoms than girls in bivariate analysis. Gender difference in the presence of depressive symptoms was eliminated after controlling for other variables. This seems to be consistent with what Takakura and Sakihara found in their study [*23*]. Allgood-Merten, Lewinsohn and Hops also found that the association between gender and Center for Epidemiological Studies Depression Scale score was reduced to a non-significant level after controlling for differences between girls and boys in psychosocial variables [*13*]. Moreover, there was a tendency for boys to show more stable or persistent depressive symptoms than girls in other studies [*24,25*]. Examining the correlates of symptoms of depressed mood among adolescents in 2 dramatically different cultures (China and the United States of America), Greenberger et al. concluded that gender differences in depressive symptoms were greater among the American youths [*25*].

Abdel-Khalek and Soliman administrated the Arabic Children's Depression Inventory in a version re-translated back into English to a sample of 535 American school students (11–18 years old). They found that differences by sex on the inventory total score were not statistically significant [*26*]. In Kuwait, it was noted that boys who had lost a family member in the 1990 Gulf War were significantly more likely to have depressive symptoms than girls. Boys had a higher mean score on the Arabic Children's Depression Inventory than girls [*27*]. Compas et al. found that gender differences were moderate in magnitude and consistent in referred youths, with referred girls scoring higher than referred boys on measuring depression, whereas gender differences in non-referred adolescents were either non-significant or small in magnitude [*28*].

How can the gender difference in depressive symptoms be explained? Chronic strain, low mastery, and rumination were each more common in women than in men and mediated the gender difference in depressive symptoms [*20*]. However the researchers questioned whether this finding could be generalized to explain gender differences in depressive disorders. They suspected that depressive disorders in women may be more closely tied to trauma than to everyday strain. Others have indicated that gender differences in depression symptoms may largely be the result of higher levels of self-esteem among males [*29*]. Rice, Harold and Thapar found that depressive symptoms in adolescents, particularly when self-rated, were significantly genetically determined. Genetic factors were of greater importance for boys, whereas common environmental influences were of less importance [*30*]. In another study, preadolescent, boys had higher levels of self-reported depressive symptoms than girls. Levels in girls increased rapidly in early adolescence, but in boys it either increased only slightly or remained stable [*31*]. According to Wichstrom, this is explained in part by increased developmental challenges for girls; pubertal development, dissatisfaction with weight

and attainment of a mature female body, and increased importance of feminine sex-role identification [*32*]. Ge, Conger and Elder agreed, showing that early-maturing girls represented the group with the highest rate of depressive symptoms in their study [*33*].

In the current study, age was significantly associated with depression in the Alexandria sample, but not the Omani sample (where there was no difference between the sexes). Poli et al. also found that younger adolescents scored lower than older adolescents [*34*]. Age did not play any significant role in predicting depression in the Omani sample or in the male sub-sample. Twenge and Nolen-Hoeksema argued that not all studies of self-reported depression symptoms in community samples of children and adolescents have found this age–sex interaction [*35*].

Another important predictor of depression in the female sub-sample from Alexandria and the Egyptian merged set, the Omani male sub-sample and the overall merged set was cigarette smoking. These findings are consistent with those of a number of other studies [*35–37*]. Adolescents with symptoms of depression were more likely to start smoking, to smoke more and to continue smoking as young adults [*36*]. Smokers with mild or major depression found it hard to quit smoking [*37–39*].

A poor relationship between adolescents and their parents seemed to affect girls more than boys in the Alexandria set of data and the merged set of data. Patten et al. concluded that lack of perceived parental social support is strongly related to depressive symptoms. Girls appeared particularly vulnerable if they lived in a non-supportive household [*40*]. Moreover, a poor relationship with parents may lead to physical abuse of the child; this was a variable significantly associated with adolescent depression in almost all the models in the current study, and is a finding supported by many other studies [*41–43*].

To conclude, gender differences in rates or correlates of depression exist but differ according to the country. Depression prevention programmes should be tailored for each country to take such differences into considerations. Reducing cigarette smo-king among adolescents should be a focus of interventions for prevention of depression [*37*].

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