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ORIGINAL ARTICLE

Gender differences in co-occurrence of depressive and anger symptoms among adolescents in five Nordic countries

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Abstract

Aims: The aim of this study was to carry out a comparative examination on gender differences in depressive and anger symptoms and their co-occurrence, using comparative self-report survey data from 16-19-year-old students in five Nordic countries. **Methods**: In total, 8038 adolescents participated in the study, 4183 females (52%) and 3855 males (48%) with an average age of 17.1 years. Analysis of Covariance (ANCOVA) was used to test for gender differences in symptoms for the sample as a whole and also for each country. Furthermore, partial bivariate correlation was carried out and followed up by ANCOVA to test for gender differences in the co-occurrence of depressive and anger symptoms in the five countries. **Results**: The results indicated that, on average, adolescent females reported higher levels of depressive symptoms than males in all the countries under study and higher levels of anger symptoms in four out of five countries. The relationship between depressive and anger symptoms turned out to be stronger for females than males for all the countries under study, demonstrating higher co-occurrence of depressive and anger symptoms on average among females than males. ***Conclusions*: The findings underline the need for attending to both depressive and anger symptoms among adolescents when designing mental health interventions and treatments as co-occurrence of both types of symptoms is common, particularly among females.**

Key Words: *Mental health, depressive symptoms, anger symptoms, gender, co-occurrence, comorbidity, adolescence*

Introduction

Improving adolescent mental well-being remains a challenge for most societies [1,2]. The mental health action plan for 2013 to 2020, recently published by the World Health Organization, demonstrates the need for a collective evidence based effort to improve mental health [2]. Mental health problems remain a devastating burden for individuals and societies. Worldwide, depression alone is considered to be one of the largest single causes of disability and health loss. This is particularly true for women, as they have been shown to be at particular risk in this respect [2]. This gender difference also applies to adolescents, as empirical studies have repeatedly indicated that young females report and exhibit more symptoms of depression and anxiety than young males [3–6]. The gender difference has been shown to surface during adolescent years and persist through adulthood [3,7], with the prevalence of depression in community studies of adults being about twice as high for women as men [8]. In line with this, depression has been the focus of most studies examining mental health issues among females, while studies among males have tended to focus more on anger, frustration and aggression [9,10]. Only recently studies have started looking more closely at gender differences in subjective anger experiences, particularly among children and adolescents [9,11,12]. Recent studies indicate that females are not less likely to experience feelings of anger than males. While some studies have found no

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or little gender differences [11,13,14], quite a few studies have suggested that feelings of anger are more frequent, more common and even more enduring among females than among males [10,15–18]. For example, a recent study showed that adolescent girls had higher scores of self-assessed anger, anxiety and depression as measured by Becks Youth Inventory [17].

While numerous prior studies have treated depressive and anger symptoms as completely separate mental health outcomes, it is evident that these two emotional problems co-occur to a great extent [10,19]. Hence, individuals who experience sadness, loss of energy and hopelessness about the future are also likely to experience anger attacks and temper outbursts that they find hard to control. At the same time it has been pointed out that these emotional problems associate differently with behavioral problems for the genders. In particular, in studies looking at the link between stressful life experiences, emotional reactions and behavioral problems, anger has turned out to be a stronger predictor of delinquency among males than females [20,21]. One possible explanation for this difference put forward in the literature has been that it is more common among females who experience anger problems to have co-occurring depressive symptoms, which hence may decrease the likelihood of their delinquent behavior [20–22]. For this assumption to hold, it needs to be demonstrated that depressive symptoms and anger symptoms co-occur to a greater extent among female adolescents compared with males. Studies conducted among Icelandic adolescents have lent some support to the hypothesis that depressive and anger symptoms co-occur to a greater extent among females than males [20,21]. However, evidence is needed from other populations to conclude about these gender differences. Hence, to gain a fuller understanding of these gender differences in co-occurrence of depressive and anger symptoms, it is necessary to carry out a methodologically sound comparative cross national study among females and males including measures of both depressive and anger symptoms. To date, no such comparative study has been performed. The other Nordic countries are ideal for such a comparative study, as they are in many ways similar to Iceland. The Nordic countries are all established welfare states, with advanced national healthcare systems, universal compulsory schooling, a generous nationalized pension establishment, similar inequality levels and employment rates [23]. The Nordic countries score relatively high on many social and health indicators, and are at the top of the list of happiest nations, with the five countries ranking in the top 9 out of 104 countries in the world [24].

Aim of this study

The current study aims at examining gender differences in both depressive and anger symptoms and their co-occurrence, among adolescents aged 16-19 years in five Nordic countries. Based on the literature, first it was hypothesized that females would report higher mean levels of depressive and anger symptoms in all the countries under study, and, second, that females would be more likely to report co-occurrence of both depressive and anger symptoms compared with males in all the countries under study. When testing the hypotheses, potentially confounding influences of age were controlled for in the analysis [3].

Method

Participants and procedure

The data used in the current study were based on the Nordic Youth Research, which was conducted among students in junior colleges, including student age groups of 16-19 years, in the Nordic countries in autumn 2009 and early 2010 [25]. A cross-sectional self-report survey was conducted in five Nordic countries among selected classes of junior college students in each country. In Iceland the classes were randomly selected; in Norway the classes were randomly selected, but stratified by region, centrality and size; in Aland Islands all schools were selected, including all classes in some of the schools but conveniently selected classes in some of the schools; in Denmark stratified sampling was used; and in Finland cluster sampling was used [25]. The total number of participants in the current study was 8038, including 4183 females (52%) and 3855 males (48%) with an average age of 17.1 years (SD 0.95). The total number of participants by country was as follows: Aland Islands (n=552), Denmark (n=1295), Finland (n=2094), Iceland (n=1824) and Norway (n=2273). Regarding the age distribution in different countries, the participants ranged from 16 to 19 years in all the countries with the average (M) and standard deviation of the mean (SD) by country as follows: Aland Islands (M 17.2; SD 0.96), Denmark (M 17.1; SD 0.92), Finland (M 16.9; SD 0.87), Iceland (M 17.1; SD 1.09) and Norway (M 17.1; SD 0.91). The response rate ranged from 70% to 90% for the countries. Anonymous questionnaires were administered by teachers in a test-like school environment. The participants had 80 minutes (two school lessons) to complete the questionnaire and seal it in a blank envelope. Data collection was conducted in accordance with the Privacy and Data Protection Authority in Iceland, including anonymity

and participants' informed consent. It was carried out by and directed by the Icelandic Centre for Social Research and Analysis for the Icelandic Ministry of Education, Science and Culture and The Nordic Council of Ministers.

Measures

Gender and age. Participants were asked about their gender and age. Gender was a dichotomous variable, with the values of 0 (male) and 1 (female). The variable age had four values ranging from 16 to 19 years.

Depressive symptoms. To measure depressive symptoms, the participants were asked seven questions from the depression dimension of SCL-90, a multidimensional self-report symptom inventory [26,27]. The participants were asked how often during the previous 30 days they felt or experienced the following: 'Sad or had little or no interest in doing things'; 'Lonely'; 'Cried easily or wanted to cry'; 'Sad or blue'; 'No interest in things'; 'Slow or had little energy'; 'Hopeless about the future'. Answers to each statement ranged on a 5-point scale from: 0 = 'Never'; 1 = 'Seldom'; 2 = 'Sometimes'; 3 = 'Often'; to 4 = 'always', and were computed into a scale ranging from 0 to 28. The Cronbach's alpha for the scale was calculated for all the countries in the study. The alpha scores ranged from 0.88 to 0.92, indicating a good internal consistency for the measure in all the countries. Furthermore, a factor analysis of the seven items yielded a single factor for all the countries, explaining 59-68% of the total variance of the seven items (eigenvalues ranging from 4.2 to 4.8). The factor analysis indicated that all of the items were of importance in the depression scale, as all the factor loadings were high for all the countries (ranging from 0.70 up to 0.90) and none of the communalities were low (ranging from 0.50 to 0.76).

Anger symptoms. Five items based on the SCL-90, a multidimensional self-report symptom inventory, were used to assess the severity of anger problems. The participants answered five questions from the anger-hostility dimension of SCL-90, a multidimensional self-report symptom inventory [26,27]. They were asked how often during the previous week they felt the following: 'You were easily annoyed or irritated'; 'You experienced temper outbursts that you could not control'; 'You had the urges to break or smash things'; 'You got into an argument'; and 'You shouted or threw things'. Answers to each statement ranged on a 4-point scale from: 0 = 'Never'; 1 = 'Seldom'; 2 = 'Often'; to 3 = 'Always', and were computed into a scale ranging from 0 to 15. The Cronbach's alpha for the scale was calculated for all the countries in the study. The alpha scores ranged from 0.81 to 0.86, indicating a good internal consistency for the measure in all the countries. Furthermore, a factor analysis of the five items yielded a single factor for all the countries, explaining 57-65% of the total variance of the five items (eigenvalues ranging from 2.9 to 3.3). The factor analysis indicated that all of the items were of importance in the anger scale, as all the factor loadings were high for all the countries (ranging from 0.71 up to 0.85) and none of the communalities were low (ranging from 0.50 to 0.72).

Statistical analysis

To test for gender differences on the scales measuring depressive and anger symptoms, two Analysis of Covariance (ANCOVA) models were run. The first model using gender as the fixed factor, age as a covariate and depressive symptoms as the dependent variable, and the second using gender as the fixed factor, age as the covariate and anger symptoms as the dependent variables. First, these two models were analyzed for the whole sample and then for each of the five countries under study. To test for differences in co-occurrence of depressive and anger symptoms for females and males, Pearson's r partial correlation coefficients were calculated for females and males separately when controlling for age. This analysis was carried out, both for the whole sample, as well as for each of the countries under study. To test if the association between these two symptom scales of depression and anger was statistically different for the genders, another ANCOVA was carried out, using depressive symptoms as a dependent variable, gender as a fixed factor and anger and age as covariates. This tested for the main effects of gender, anger and age on depressive symptoms and testing interaction effects between gender and anger on depressive symptoms (i.e. gender*anger). These analyses were carried out for the sample as a whole, and for each of the five countries under study.

Results

The results from the ANCOVA models can be seen in Table I. The results indicated that for the whole sample of adolescents, females reported significantly higher mean levels of depressive ($F = 962.2$, $p < 0.001$) and anger ($F = 60.0$, $p < 0.001$) symptoms than males. When this analysis was conducted separately for the five countries, the results indicated significant gender difference in depressive symptoms for all the countries under study with females reporting on average more symptoms (see Table I). For anger

Table I. Gender difference in mean levels of depressive symptoms and anger symptoms for the five countries using Analysis of Covariance (ANCOVA), with age as a covariate.

	Model 1					Model 2				
	Depressive symptoms					Anger symptoms				
	N	*M*	*SD (SE)*	*95% CI*	*F*	*N*	*M*	*SD (SE)*	*95% CI*	*F*
Aland Islands										
Females	222	10.3	6.66 (0.386)	9.5–11.0	127.6[b]	224	3.2	3.01 (0.194)	2.9–3.6	11.1[a]
Males	315	4.6	5.00 (0.324)	4.0–5.2		314	2.4	2.81 (0.164)	2.1–2.7	
Denmark										
Females	610	8.0	5.68 (0.211)	7.6–8.4	160.5[b]	619	3.1	2.93 (0.111)	2.9–3.3	14.8[b]
Males	640	4.3	4.71 (0.206)	3.8–4.7		650	2.5	2.60 (0.108)	2.3–2.7	
Finland										
Females	1118	9.1	5.70 (0.157)	8.8–9.4	334.6[b]	1157	2.9	2.57 (0.080)	2.7–3.0	43.4[b]
Males	882	4.8	4.65 (0.177)	4.4–5.1		921	2.2	2.25 (0.074)	2.0–2.3	
Iceland										
Females	908	7.8	5.81 (0.183)	7.4–8.1	106.5[b]	912	2.9	2.64 (0.091)	2.7–3.1	ns
Males	858	5.1	5.19 (0.188)	4.7–5.4		866	3.0	2.89 (0.094)	2.8–3.2	
Norway										
Females	1186	9.6	6.23 (0.170)	9.3–9.9	267.1[b]	1216	3.2	2.82 (0.081)	3.0–3.4	21.8[b]
Males	976	5.5	5.36 (0.187)	5.1–5.8		990	2.6	2.85 (0.090)	2.4–2.8	
Total										
Females	4044	8.8	6.00 (0.087)	8.7–9.0	962.2[b]	4128	3.0	2.74 (0.042)	3.0–3.1	60.0[b]
Males	3671	4.9	5.03 (0.092)	4.7–5.1		4741	2.6	2.69 (0.044)	2.5–2.6	

ns: non significant; F: F test, testing for gender difference between means.
[a]$p<0.01$.
[b]$p<0.001$.

Table II. Pearson Partial Correlation coefficients for females and males for the relationship between depressive symptoms and anger symptoms, when controlling for age.

	Aland Islands	Denmark	Finland	Iceland	Norway	Total
Females	0.50	0.54	0.57	0.55	0.54	0.54
Males	0.42	0.43	0.45	0.42	0.37	0.41

All Pearson *r* correlation coefficients are significant at $p<0.001$.

symptoms, females reported higher mean levels than males in all the countries, with the exception of Iceland where there was no significant difference between the genders (see Table I).

In Table II the partial correlation coefficients for the interrelationship between depressive symptoms and anger symptoms, controlling for age, is indicated for the whole sample as well as for each of the five countries. The results suggested that the partial correlation between depressive symptoms and anger symptoms was stronger for females than males.

To test if the interrelationship between depressive and anger symptoms was significantly stronger for females than males Analysis of Covariance was conducted, using depressive symptoms as a dependent variable, gender as a fixed factor and age and anger as covariates, testing for main effects and interaction effects between gender and anger (see Table III). The results in Table III indicate that gender interacted with anger when predicting depressive symptoms ($F = 108.8$, $p < 0.001$), which indicates that the relationship between anger and depressive symptoms was significantly stronger for females than males. When this analysis was run for each of the countries separately, the results indicated a similar and significant interaction effect for all the countries under study as follows; Aland Islands ($F = 5.5$, $p < 0.05$), Denmark ($F = 9.6$, $p < 0.01$), Finland ($F = 12.0$, $p < 0.01$), Iceland ($F = 31.7$, $p < 0.001$), and Norway ($F = 41.6$, $p < 0.001$).

Discussion

The current study examined comparative data on both depressive and anger symptoms among adolescents in five Nordic countries. The results supported all of the hypotheses put forth. First, they showed that young females reported on average higher mean

Table III. Analysis of Covariance (ANCOVA), with gender as the fixed factor, age and anger as covariates and depressive symptoms as the dependent variable.

	Mean square	F	*p*
Corrected model	21756.76	933.4	< 0.001
Gender	4908.751	210.60	< 0.001
Age	293.851	12.608	< 0.001
Anger	53172.956	2281.2	< 0.001
Gender*Anger	2535.547	108.8	< 0.001

levels of depressive symptoms than males in all the countries under study. Second, they also showed that young females reported on average higher mean levels of anger symptoms than young males in all the countries, with the exception of Iceland where there was no significant difference between the genders. Third, the findings showed that in all the countries females were significantly more likely to report both depressive and anger symptoms, hence indicating more co-occurrence of these symptoms for females than males.

Not surprisingly the findings, revealing a gender gap in depressive symptoms, are consistent with several epidemiological studies that have been carried out before [3–7]. Prior studies among adults have shown that the prevalence of depression is about twice as high for women as men [8]. The current study reveals that even in adolescent years, between 16 and 19, the difference has already become this large in most of the countries under study. Most studies on gender differences in mental health have focused on depression while anger symptoms have received much less attention [3–8]. The current study shows that gender differences in self-reported anger symptoms also exists in most of the countries under study, although the difference is less than in depressive symptoms. These results are in accordance with recent self-report studies conducted among adolescents indicating higher scores on self-assessed anger experiences among young females than males [10,15–18]. Prior studies within different fields have discussed possible reasons for these gender differences [20]. Within the mental health literature the focus has often been on higher rates of depression among girls, while the criminology literature has more often focused on examining anger and aggression among boys. Both traditions have emphasized the importance of stress as a key explanation for depressed mood and anger [10].

Of most interest in the current study were the results on gender differences in co-occurrence of depressive and anger symptoms. Recent studies have highlighted the importance of examining symptoms of depression and anger at the same time, as they greatly overlap and have been indicated to predict different kinds of behavior [19–21]. The current study adds to existing knowledge by showing that not only are adolescent females more likely to report depressive symptoms and anger symptoms, but among young females these symptoms are also more likely to co-occur in the same individuals. The current results for Iceland are interesting in this regard, as it is the only country in the current study not to indicate a significant gender difference in anger symptoms, but shows a similar gender difference in the co-occurrence of depressive and anger symptoms to the other countries. This suggests that although anger may not always be more common among females than males, it is likely that females are still at more risk than males to show co-occurring symptoms of depression and anger. As earlier studies among younger and same aged adolescents in Iceland have indicated higher mean levels of self-reported anger for females than males, it remains unexplained why in the current study this gender difference is not demonstrated [20,21]. Future studies should look into this topic more thoroughly, to conclude whether these results may be attributed to cohort effects.

These findings are important and support the hypothesis that depressive and anger symptoms co-occur to a greater extent among young females than males in the Nordic countries. Future comparative studies should investigate behavioral outcomes among adolescents with co-occurring depressive and anger symptoms in different populations. The suggestion that this higher co-occurrence among females may explain, at least in part, why they are not as likely to show externalizing behavioral problems, including delinquency, needs to be tested in future comparative studies [20–22].

The main strengths of the current study are the comparative nature of the data, where the same measures and methodology were used in all the countries, and the focus on both depressive and anger symptoms in the same study. Furthermore, it is important to note the data are of high quality, using representative samples of 16-19-year-old students in five counties. However, the study has limitations which need to be addressed. First, the study relies on self-report measures, where recall biases and inaccuracy of reported symptoms cannot be ruled out. Second, the study does not rely on diagnostic tools or clinical measures of depression and anger but on a self-report survey used to assess these emotional problems on a dimension. Third, the study is cross-sectional and can therefore not conclude about temporal relationship between phenomena, such as depressive and anger symptoms.

Finally, when interpreting the current results it is important to note that the depressive and anger measures did not have the same temporal range in reported symptoms, hence asking about the last 30 days of depressive symptoms but the last week for anger symptoms. As these measures were the same for all the countries and both genders, this should not have affected the comparative nature of the study. To further understand the complicated interrelationship between depressive and anger symptoms and the relationship with behavioral outcomes, future studies should preferably be longitudinal, include both genders and include valid and reliable measures of depression and anger as well as diverse internal and external behavioral problems.

In conclusion, the findings of this study underline the need for attending to both depressive and anger symptoms among adolescents. While both genders experience co-occurrences of symptoms of anger and depression, such co-occurrence is more commonly reported by adolescent females than males. In the light of recent studies which have highlighted the co-occurrence of these two phenomena in adult life and pointed out the need for routine mental health assessment including measures of both depression and anger/aggression, the current results suggest that such screening is essential among younger adolescent age groups [28,29]. This is of great importance as studies have indicated that individuals who suffer from depression and comorbid anger attacks are at increased risk for diminished quality of life and suicidal attempts [29,30]. Such a comprehensive mental health assessment should be followed up by evidence based mental health services aiming at reducing these emotional problems, increasing well-being and enhancing the function of protective factors and support in the lives of adolescents [1,2,19].

Key points

- On average adolescent females reported significantly higher mean levels of depressive symptoms than males in all the five countries and higher levels of anger symptoms in four out of five countries.
- The relationship between depressive and anger symptoms was significantly stronger for females than males in all the five countries, demonstrating more co-occurrence of depressive and anger symptoms on average among females than males.
- The results indicate that mental health interventions and treatments need to attend to both depressive and anger symptoms among adolescents, particularly among females.

Conflict of interest

None declared.

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