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The incidence of eating disorders among upper secondary school female students

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Summary

Aim. The aim of the present study is to evaluate the incidence and prevalence of eating disorders in the population of Polish upper secondary school female students, while considering the type of school and living conditions.

Methods. The investigations of eating disorders were conducted between March and June 2017 and covered female students of the upper secondary schools of Szczecin. Selection for the survey was multistep. 1,750 questionnaires were included in the analysis. The study used a tool for screening for the occurrence of eating disorders – the Eating Attitudes Test (EAT-26).

Results. Lower scores were observed among higher grade students (EAT-26, EAT dieting) as well as those who did not receive pocket money (EAT dieting, EAT bulimia) ($p < 0.05$).

Conclusions. (1) Age has proved to be an important prognostic factor for eating disorders. The risk decreased as the age of the examined girls increased. (2) The risk of eating disorders was almost 21 times higher among first and second grade girls.

Key words: eating disorders, adolescents, EAT-26

Introduction

Research on the incidence and prevalence of eating disorders has not been often undertaken in recent years, either in Poland or worldwide. Also, it is difficult to estimate the prevalence of these disorders. In the statistics of the World Health Organization (WHO), data on the incidence of eating disorders are usually included in the cumulative category of mental disorders [1]. Neither does the Statistical Office of the European Union provide official data on this subject [2]. Problems with estimating the scale of

the phenomenon are due to the fact that, firstly, these disorders occur relatively rarely in the population and, secondly, patients avoid professional help, not being aware of their illness [3]. Studies on the prevalence of eating disorders in the United States indicate that anorexia affects 0.3% of teenagers (boys and girls); bulimia affects 1.3% of girls (and 0.5% of boys); and binge eating disorder (BED) affects 2.3% of girls (and 0.8% of boys) [4]. It is not only the number of people with disordered eating, but also the number of new cases, or incidence rate, that poses difficulty in estimating (studies of this type are scarce [3]). The number of new anorexia cases, as a whole, has stayed at the same level over recent decades, though an increase has been noted in the population of women aged 15–19 years [3]. By contrast, the number of new bulimia cases has decreased, compared to the 1990s [3]. Meanwhile, eating disorders involve considerable losses. These disorders have the highest mortality rate of all mental disorders, and an increase in the risk of death among people suffering from them has been observed over the years [3]. It is estimated that the DALY (*disability adjusted life-years*) indicator for eating disorders in the world is 29.49 per 100,000. For the United States, this value is higher, amounting to 62.27 per 100,000, while for the Western Europe – it is as high as 71.26 per 100,000. In Poland, this value is estimated to be relatively low, namely, 26.33 per 100,000 inhabitants. For comparison, in Poland the DALY indicator for all mental disorders is 2,259.99 per 100,000 inhabitants [5].

Epidemiological studies of eating disorders may be underestimated due to a relative low rate of their incidence and their small share of the DALY indicator. Nevertheless, early detection of eating disorders may prevent from the development of the illness and reduce the risk of its long-term effects [6]. It is presumed that 25–33% of patients with anorexia or bulimia develop other chronic diseases [7]. This justifies the need for undertaking research on the incidence and prevalence of eating disorders.

The occurrence of eating disorders and their symptoms falls on the mid-to-late adolescence [8, 9]. It is estimated that 13% of girls before the age of 20 experience one of these disorders [9]. For this reason, screening for them should be carried out, especially in the group of teenagers.

There is a fairly small group of studies on the relationship between eating disorders and the family living conditions. Isolated studies on this subject show that eating disorders are not associated with the material situation of the family [10, 11], but rather with its education level [12]. On the other hand, there are no studies of the incidence of eating disorders depending on the type of education (vocational school, technical college, general upper secondary school). Meanwhile, this type of information could help identify risk groups to which health education and preventive measures should be primarily addressed. In view of the above, the aim of the present study is to evaluate the incidence and prevalence of eating disorders in the population of Polish upper secondary school female students, while considering the type of school and living conditions.

Material and methods

The investigations of eating disorders were conducted between March and June 2017 and covered female students of the upper secondary schools of Szczecin. Selection

for the survey was multistep. In the first step, a target method was used. An invitation to participate in the survey was issued to schools in the Szczecin City Commune area. Then, based on the conscious and voluntary consent of the female students, an anonymous survey was carried out based on the questionnaire technique. The selection was non-probabilistic in character. To do this, the size of a representative group was estimated. The size of the study group was determined on the basis of the Szczecin City Commune Office's numerical data concerning the number of upper secondary school female students,. For a population of 7,145 individuals, with a size fraction of 0.5, a confidence level of 95% and a maximum error of 2%, the study group size was set at a level of 1,797 girls. Finally, 1,750 (97.4%) correctly filled questionnaires were included in the statistical process.

Study group

The median age of girls participating in the survey was 17 years. The youngest participant was 15 years old, while the oldest, 22 years old. The interquartile range of age was equal to 1 ($Q_1 = 17$; $Q_3 = 18$). In the study group, the majority of surveyed girls (36.63%) were first grade students (Table 1), while fourth grade students were constituted the least numerous group (5.26%). A four-year education concerned only technical schools, where schoolgirls accounted for 37.37%. Half of the subjects attended general upper secondary schools (50.29%). In the residence structure, schoolgirls living in the city predominated, with only 21.31% of the subjects living in the country. More than half of them described their housing conditions as very good (62.63%). Similarly, they often declared receiving pocket money (67.66%). For this information item, the highest percentage of missing data was observed (4.00%).

Table 1. **Frequency distribution of analyzed variables**

Variables		n	%
Year	1	641	36.63%
	2	538	30.74%
	3	457	26.11%
	4	92	5.26%
	no data available	22	1.26%
School type	general upper secondary school	880	50.29%
	technical college	654	37.37%
	vocational school	216	12.34%
	no data available	0	0.00%
Place of residence	city	1,369	78.23%
	village	373	21.31%
	no data available	8	0.46%

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Housing conditions	very good	1,096	62.63%
	good	523	29.89%
	average	115	6.57%
	poor	8	0.46%
	no data available	8	0.46%
Pocket money	receiving	1,184	67.66%
	not receiving	496	28.34%
	no data available	70	4.00%
Total		1,750	100.00%

Research methods

In the research process, a tool designed for screening for the occurrence of eating disorders – the Eating Attitudes Test (EAT-26) – was employed. The EAT-26 is a standardized test for detecting the symptoms of eating disorders [13]. It is used for screening populations at risk of anorexia, bulimia and obesity [14]. The EAT-26 is a scale created by D. Garner and P. Garfinkel in 1982 as a 26-item version of a scale for testing eating attitudes and behaviors. It is used both in examining people with a clinical diagnosis, and – as the most popular tool – in screening tests. The author of the Polish standardization of the tool is K. Włodarczyk-Bisaga [15]. The number of points possible to be obtained range from 0 to 78. A person who has obtained 20 points or more is at risk of the occurrence of an eating disorder and should be examined by a professional [16, 17]. In addition to the global result, there is also the possibility of analyzing three EAT-26 domains, such as: (1) dieting, (2) bulimia and food preoccupation, (3) oral control.

The authors' classification into the risk group was made when at least 10 points were obtained in the EAT – dieting domain and at least 5 points for the EAT – bulimia & food preoccupation and EAT – oral control domains (Table 4).

The questionnaire prepared by the authors, which asked questions about socio-economic characteristics (age, place of residence, year, school type, receiving pocket money, housing conditions), was also used in the survey

Statistical analysis

The collected material was subjected to statistical analysis using the PASW Statistics 18 software. The elements of descriptive and mathematical statistics were used. To select analytical tests, the distribution of quotient variables was verified using the Shapiro-Wilk test. The distribution normality ($p < 0.05$) was not confirmed, therefore, non-parametric tests, namely, the Mann-Whitney (Z), Chi-square (χ^2), and the Kruskal-Wallis (H) tests, were employed. Using the Cronbach's alpha test, the reliability

of the analyzed data was verified. In addition, we used multiple logistic regression to determine the effect of explanatory variables on the odds ratio (OR) of the higher risk of occurring eating disorders (EAT-26) with a 95% confidence interval. The significance level was set at a level of $\alpha = 0.05$.

Results

The eating disorder investigation has shown that the median of scores obtained in the study group is 7, which means that in the majority of the subjects no eating disorders occurred. The results for the three eating disorder domains (Table 2) look similar. The reliability of the total result and results obtained in individual EAT-26 domains by the survey participants has been confirmed.

Table 2. **Statistical description of EAT-26 coefficients**

Statistics	EAT-26	EAT – dieting	EAT – bulimia	EAT – oral control
Me	7.00	5.00	0.00	1.00
Q_1–Q_3	4.00–11.00	2.00–8.00	0.00–1.00	0.00–2.00
min-max	0–34	0–20	0–10	0–10
Cronbach's alpha	0.760			

Me – median; Q1 –Q3 – the first and third quartile; min-max – minimal and maximal

It was decided to verify (Table 3) whether the number of points reflecting eating disorders (EAT-26) was significantly differentiated with the selected independent variables, or not. These differences were confirmed for the school type. Individuals attending vocational school obtained a lower median of points than the students of technical schools and general upper secondary school (Me = 6 vs. Me = 7) ($p < 0.05$). This relationship applied also to individual EAT-26 domains (Figure 1). Moreover, lower scores were observed among higher-grade students (EAT-26, EAT – dieting) and also those who did not receive pocket money (EAT – dieting, EAT – bulimia) ($p < 0.05$).

Table 3. **The occurrence of differences in eating disorder levels while considering the selected variables**

Variable		EAT-26	EAT – dieting	EAT – bulimia	EAT – oral control
School type	H	11.828	8.265	15.324	2.815
	p	0.003	0.016	0.000	0.245
Year	H	13.248	13.181	3.604	6.159
	p	0.004	0.004	0.308	0.104
Place of residence	Z	-0.643	-0.199	-0.671	-0.015
	p	0.520	0.842	0.502	0.988
Pocket money	Z	-1.258	-1.992	-2.014	-0.498
	p	0.208	0.046	0.044	0.618

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Housing conditions	H	2.787	4.428	0.249	1.056
	p	0.426	0.219	0.969	0.788

In general, 5.5% of the subjects (95 girls) were classified into the group with the increased risk of eating disorders (EAT-26 at the level of 20 points and more). Disorders occurred significantly more often in the female students of general upper secondary schools (6.7%; 59 subjects), who were in grade 2 (6.9%; 37 subjects) ($p < 0.05$). For the EAT – dieting domain, the percentage of girls at risk was higher than in the EAT-26 in total – 17.6% (306 subjects). Similarly, general upper secondary school students (20.9%; 184 subjects) and those in grade 2 were more often in the increased risk group ($p < 0.05$). The group of increased EAT – oral control risk included more female students of vocational schools (13.0%; 28 subjects) and those who described their housing conditions as poor (37.5%; 3 subjects). For the EAT – bulimia & food preoccupation domain, the percentage of those at risk was the lowest (4.9%; 85 subjects). No significant differences in the groups of independent variables were observed ($p > 0.05$).

Table 4. **The occurrence of increased risk of eating disorder in respect of selected variables**

		EAT-26					EAT – dieting				
		no risk		increased risk		χ^2;	no risk		increased risk		χ^2;
		n	%	n	%	Fisher [a]; p	n	%	n	%	Fisher [a]; p
School type	general upper secondary school	821	93.3	59	6.7	5.749 0.050	696	79.1	184	20.9	15.321 0.001
	technical college	628	96.0	26	4.0		554	84.7	100	15.3	
	vocational school	206	95.4	10	4.6		192	88.9	24	11.1	
Year	1	605	94.4	36	5.6	8.126 0.043	524	81.7	117	18.3	10.925 0.012
	2	501	93.1	37	6.9		425	79.0	113	21.0	
	3	436	95.4	21	4.6		392	85.8	65	14.2	
	4	92	100.0	0	0.0		82	89.1	10	10.9	
Place of residence	city	1,300	95.0	69	5.0	0.157[a] 0.095	1125	82.2	244	17.8	0.645[a] 0.324
	village	347	93.0	26	7.0		311	83.4	62	16.6	
Housing conditions	very good	1,031	94.1	65	5.9	4.602 0.203	897	81.8	199	18.2	1.512 0.679
	good	497	95.0	26	5.0		433	82.8	90	17.2	
	average	113	98.3	2	1.7		99	86.1	16	13.9	
	poor	7	87.5	1	12.5		7	87.5	1	12.5	
Pocket money	receiving	1,113	94.0	71	6.0	0.242[a] 0.122	967	81.7	217	18.3	0.294[a] 0.157
	not receiving	474	95.6	22	4.4		416	83.9	80	16.1	
Total		1,642	94.5	95	5.5		1431	82.4	306	17.6	

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		EAT – bulimia & food preoccupation					EAT oral control				
		no risk		increased risk		χ^2; Fisher [a]; p	no risk		increased risk		χ^2; Fisher [a]; p
		n	%	n	%		n	%	n	%	
School type	general upper secondary school	833	94.7	47	5.3	0.703	814	92.5	66	7.5	8.055
	technical college	625	95.6	29	4.4	0.704	607	92.8	47	7.2	0.018
	vocational school	206	95.4	10	4.6		188	87.0	28	13.0	
Year	1	605	94.4	36	5.6	1.719	582	90.8	59	9.2	4.284
	2	515	95.7	23	4.3	0.633	498	92.6	40	7.4	0.232
	3	436	95.4	21	4.6		420	91.9	37	8.1	
	4	86	93.5	6	6.5		89	96.7	3	3.3	
Place of residence	city	1,305	95.3	64	4.7	0.345[a]	1,267	92.5	102	7.5	0.131[a]
	village	351	94.1	22	5.9	0.201	336	90.1	37	9.9	0.076
Housing conditions	very good	1,046	95.4	50	4.6	1.48	1,016	92.7	80	7.3	10.909
	good	494	94.5	29	5.5	0.687	476	91.0	47	9.0	0.012
	average	108	93.9	7	6.1		105	91.3	10	8.7	
	poor	8	100.0	0	0.0		5	62.5	3	37.5	
Pocket money	receiving	1,128	95.3	56	4.7	0.539[a]	1,087	91.8	97	8.2	0.693[a]
	not receiving	469	94.6	27	5.4	0.307	459	92.5	37	7.5	0.346
Total		1,652	95.1	85	4.9		1,598	92.0	139	8.0	

Finally, it was decided to determine the group of factors increasing the risk of the occurrence of eating disorders (Table 5). The multi-factorial logistic regression model was employed. Low concurrence existed between the actual data and the model presented in our study ($R^2 = 0.274$).

Table 5. **The multi-factorial logistic regression of the prevalence of eating disorders**

Variables	OR (95% CI)	p
Age	0.730 (0.525–1.015)	0.062
Village vs. city	1.023 (0.395–2.651)	0.963
Technical college and vocational school vs. general upper secondary school	0 (0–.)	0.989
Vocational school vs. general upper secondary school and technical college	0.362 (0–.)	1.000
Years 1 & 2 vs. years 3 & 4	20.977 (3.684–119.453)	0.001
At most average housing conditions vs. at least good housing conditions	1.011 (0.145–7.043)	0.991
No pocket money vs. pocket money	0.544 (0.235–1.257)	0.154
EAT – dieting	246.138 (58.494–1035.721)	0.000

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EAT – bulimia & food preoccupation	20.867 (7.190–60.563)	0.000
EAT – oral control	35.216 (11.534–107.521)	0.000

1. The age turned out to be an important prognostic factor for eating disorders. The risk decreased with increasing age of the surveyed girls – 0.730 (95% CI, 0.525–1.015);
2. The chances of the occurrence of eating disorders were almost 21-times higher among girls in grades 1 and 2 – 20.977 (95% CI, 3.684–119.453);
3. No pocket reduced the analyzed risk – 0.544 (95% CI 0.235–1.257);
4. The increased risk in the EAT – dieting domain determined the increase in the overall EAT-26 risk. The odds ratio was 246.138 (95% CI, 58.494–1,035.721);
5. The chance that the overall eating disorder phenomenon was higher in the group of girls with increased risk in the EAT – bulimia & food preoccupation domain was 20.867 (95% CI, 7.190–60.563), and in the EAT – oral control domain – 35.216 (95% CI, 11.534–107.521).

Discussion

The causes of the occurrence of eating disorders are complex, and the existing results of research on this subject point out their multi-factor determination (both genetic and environmental factors [18]). One of the significant factors influencing the prevalence of eating disorders is gender. Epidemiological studies have shown that women are statistically more likely to be prone to developing eating disorders, as compared to men, and the period of peak risk falls on teenage years [19]. This relationship has also been confirmed by other studies carried out in the United States [6]. An explanation of this phenomenon may be an increased impact of the media on young women who exhibit a higher level of internalization of cultural patterns relating to the body shape, compared to men [20]. It is especially women's magazines and radio programs [21] that create specific canons of beauty that promote a slim body. The above findings are confirmed by cross-sectional studies by Hermes and Keel, which have demonstrated that thin-ideal internalization is positively correlated with advancing pubertal maturation in girls.

Another trend that shapes the contemporary attitudes of young people is their high awareness of the determinants of good health and long life. Today, a large number of people attach great importance to a healthy lifestyle by going in for sports, eating healthily or buying various devices and gadgets designed for monitoring health condition [23]. Such attitudes might justify the number of girls in this study who are in the eating disorder risk group – a little less than 5.5%.

Reports on the age of people who develop eating disorders are ambiguous. The authors' study has demonstrated that eating disorders occurred more frequently among younger students who were at lower grades. This is confirmed by the study by Abebe et al. [8], where the peak period of bulimia incidence in girls is the 14^{th}–16^{th} year of life. The World Health Organization also indicates that the lower age limit for the occurrence of anorexia is 14 years [7]. By contrast, Stice et al. [9] have determined

different age ranges. According to their study, the peak incidence of anorexia falls on 19–20 years and that of bulimia, on 16–20 years [9].

Our research shows that the incidence of eating disorders was much more frequent in lower grades than in higher grades. It can be presumed that this is related to difficulties in adapting to a new, unfamiliar environment and pressure exerted on the students by their teachers and parents. This issue is addressed by Ahrén-Moonga et al. [12] in their study which shows that the higher education of parents and grandparents, as well as higher marks obtained by them at school, increased the risk of hospitalization due to eating disorders in their female offspring – probably because of high internal and external demands. In studies by Maxwell et al. [24] the level of education also correlated with eating disorders. Similarly, the Brazilian reports [25] indicate that the lower the education level of parents, the less frequent the occurrence of eating disorders.

The analysis of our studies shows that housing conditions have no effect on the occurrence of eating disorders. This is also confirmed by the Finnish [11] and the American [4, 26] reports, as well as by the literature review by Gard and Freeman [10].

Receiving or not receiving pocket money can influence eating behavior. In our studies, girls who did not receive pocket money less often showed a tendency to eating disorders. A study carried out in China in 2015 on a group of 1,648 students shows that students receiving high pocket money more frequently (by about 25–89%) consumed soft drinks, snacks or fast foods, and they were by about 45–90% more prone to overweight/obesity [27].

Conclusions

The occurrence of eating disorders among female high school students from Szczecin is a rare phenomenon. They appear most often in the area of dietary behaviors related to diet, especially at the initial stage of education in secondary schools. With age, this phenomenon is reduced. Particular attention should, however, be paid to health behaviors undertaken by students, especially in the context of the purpose of spending financial resources on food products.

Recommendations

Austin et al. [6] reported that screening carried out in upper secondary schools countrywide has revealed a significant number of students at risk of eating disorders who are not treated. This justifies the introduction of screening as a strategy for early detection of eating disorders among young people. Another action to minimize the number of people at risk of eating disorders is education in the healthy lifestyle, perceiving one's body and eating disorders, modeled on the Norwegian program *Healthy Body Image* [28].

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