

Eating Disorders and Depression in Adolescents: The Impact of Socioeconomic Factors, Family and Peer Relations

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Abstract: This paper analyses the relation between socioeconomic characteristics, family and peer relations, depression and eating disorders with 218 (144 female, 66.1%) participants aged 14-19 from Croatia. The questionnaire encompassed questions on socioeconomic traits, family and peer relations, depression and anorexia, bulimia, binge eating and orthorexia. Girls reported most dissatisfaction with the abdominal region (38.5%), thighs (31.2%) and breasts (16.1%). Boys reported most dissatisfaction with the abdomen (12.4%), chest (10.1%) and legs/calves (7.3%). Gender was significant for depression ($p < .001$), anorexia ($p < .01$), bulimia ($p < .001$) and binge eating ($p < .05$), with girls scoring higher on all scales. Age was significant for depression ($p < .05$) in younger participants, and orthorexia ($p < .05$) for older adolescents. Participants from vocational schools reported significantly higher family life satisfaction ($p < .01$), while gymnasium students reported significantly higher depression ($p < .000$), bulimia ($p < .01$) and binge eating behaviour ($p < .01$). Higher mother's educational level was significant for anorexia ($p < .05$) and orthorexia ($p < .01$). Family relations correlated negatively with bulimia and binge eating, but positively with orthorexia. Peer relations were not significant for eating disorders. Eating disorders show positively correlated comorbidity ($p < .000$), and were significantly correlated to depression ($p < .000$). Anorexia is best predicted by bulimia ($p < .001$), orthorexia ($p < .001$), depression ($p < .01$) and mother's education ($p < .01$). Bulimia is strongly predicted by anorexia ($p < .001$), binge eating ($p < .001$), depression ($p < .001$) and gender ($p < .001$). Binge eating is strongly predicted by bulimia ($p < .001$), depression ($p < .01$) and school type ($p < .05$). Orthorexia is strongly predicted by anorexia ($p < .001$), family relations quality ($p < .05$), the mother's education ($p < .05$) and school success ($p < .05$).

Keywords: Eating disorders, adolescents, family, school, peers, depression, anorexia, bulimia, binge eating, orthorexia.

1. INTRODUCTION

Although body image dissatisfaction and eating disorders could theoretically develop in any individual, they tend to be most prevalent among adolescents. Changes in body composition lead to differences in appearance and self-image, which can influence behaviour and increase introspection or self-consciousness about mostly body-related concerns [1]. Eating disorders are psychiatric illnesses that result in irregular eating patterns with negative health effects in individuals, who develop unrealistic personal attitudes toward or abnormal body perceptions, causing behaviours that lead to destructive eating patterns with negative physical and emotional consequences [2]. They are complex, multi-faceted and acutely sensitive to societal and cultural pressures. As these disorders generally develop in childhood and adolescence, particular attention is devoted to developmental research that considers biological predispositions, societal coercion, developmental norms, mutability of behaviours, and the individual's unique response to his or her environment [3].

2. THEORETICAL BACKGROUND

The modern ecological perspective emphasises that a multitude of triggers – biological, psychosocial and cultural – may concord in a person and sway eating patterns into the realm of maladaptation at certain periods in life. *Psychoanalytic perspectives* on anorexia and obesity consider hunger an innate drive, and food an unconscious symbol of desires (e.g. love, hatred, sexual gratification, pregnancy). The fear of food intake seen in anorexia was linked with unconscious fears of oral impregnation, or fears of adulthood and sexuality [5, 4]. Hilde Bruch's [5] prolific *psychodynamic theory* emphasised that early developmental problems between mothers and children could result in a disruption of an individual's emotional and physiological experience of food and satiation, as well as affect the child's development of autonomy or inner-directedness with consequential misperceptions of body size and satiety [5]. The psychodynamic perspective speculated that anorexic and obese patients alike, experience their bodies as not being truly their own, but under the influence of others, while the behaviours associated with anorexia were means of undoing feelings of passivity, ineffectiveness and control by outside forces [3]. The next big factor were the media promoted body ideals, the lean tubular body physique in the *cult of thinness* that rendered eating disorders as adaptive

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behaviours in the face of new environmental demands [6, 7, 8]. *Psychosocial theories* emphasised personality styles of patients with restricting type anorexia nervosa, defined as obsessive, socially inhibited, compliant and emotionally restrained, while patients with bulimia nervosa exhibited personality styles described as impulsive, interpersonally sensitive and low in self-esteem, similar to borderline features [9]. Current *biopsychosocial conceptualizations* separate normal from pathological eating behaviour in a developmental perspective, encompassing a wide range of interactions between psychosocial factors and endogenous vulnerabilities, challenging the notion that symptoms are sole expressions of internal deficits, but also represent adaptations to triggers from the social environment [10, 11]. For instance, genetic epidemiological studies have uncovered evidence that eating disorders are, to some degree, hereditary [12]. Thus far there has been little evidence of genetic main effects, but gene–environment interactions with the effect of environment conditional upon the individual's genotype, are a promising research area [13]. Overall, twin studies report heritability estimates for anorexia nervosa and bulimia nervosa of between 54% and 83%. Eating disorder symptoms also appear to be heritable, as studies among twin population-based samples established heritability of approximately 32% to 72% for pathologic attitudes, including the drive for thinness, eating and weight concerns, body dissatisfaction and weight preoccupation [14]. Twin studies of binge eating, self-induced vomiting and dietary restraint have found heritability of between 46% and 82%, with non-shared environmental factors explaining the rest of the variance [15].

2.1. Eating Disorders Aetiology and Phenomenology

Body image refers to a person's inner picture of outward appearance with two components- perceptions of the appearance of one's body, and emotional responses to these perceptions based mostly on comparison to socially constructed standards or ideals. Sociocultural theories of body image disturbance "*examine the influence of common or culture-wide social ideals, expectations, and experiences on the aetiology and maintenance of body image disturbance*" [16]. Although most research on sociocultural influence focuses on the impact of media, individual differences arise from proximal influences, making media portrayed messages particularly problematic when reinforced through more immediate sociocultural agents such as parents or peers [17]. Ata *et al.* [18] postulated a

sociocultural *tripartite influence model* on formative effects in the development of body dissatisfaction. The model affirms that media, parental and peer influences can lead to the development of body dissatisfaction and eating disturbances directly, but indirectly as well, the internalization of appearance ideals and comparison to others (upward comparisons to attractive, thinner models) that can lead to increased body dissatisfaction, but narcissism as well [2]. Initial body dissatisfaction is a precondition associated with increased disordered eating behaviours (i.e., restriction and bulimia) and psychological distress with more severe forms of psychopathology [18]. *Media influence* on body image dissatisfaction was documented by a number of research studies [19, 20, 21, 22]. In one the most comprehensive studies, Field *et al.* [23] examined 7000 adolescent girls (aged 9–15) and found that the frequency of reading of women's fashion magazines was associated with the intensity of their weight concerns. Their follow-up study with the original sample established that wanting to look like media figures was a key predictor of the onset of weight concerns, while attempting to look like these media images and dieting predicted the onset of binge-eating [24, 25]. Dohnt and Tiggemann [19] found that viewing of appearance-oriented TV, but not magazines, predicted a decrease in body image satisfaction 1 year later in very young girls (aged 5–8), while Livazović [22] established a positive association between adolescent media addiction, entertainment media exposure and eating disorders. *Parental and family influences* were found to be powerful predictors of adolescent body dissatisfaction directly (e.g., appearance-related commentary and teasing, encouragement to diet) or indirectly (e.g., modelling of weight-related behaviours, parent–adolescent relationship), especially for girls teased by family members, who reported lower levels of self-esteem, with higher body dissatisfaction, social comparison, internalization of the sociocultural ideal of thinness, depression and disordered eating [26, 27]. McCabe *et al.* [28] found that parents focused on the overall appearance of girls versus the functionality of their sons' bodies, with girls receiving negative messages in regards to their bodies more than boys do. McCabe and Ricciardelli [29] affirm that reactions from mothers and fathers on the size and shape of their children's bodies predicted body image satisfaction in their daughters and sons, providing some evidence for the gender-linked transmission model, which posits that fathers exert greater influence on sons and mothers exert greater influence on daughters [30]. Still, the appraised severity, frequency, longevity and emotional

impact of teasing at the time were more influential than its mere presence or absence [31]. Modelling of weight-related behaviours in parents remains an important factor, as girls who report maternal dieting are more likely to have engaged in both healthy and unhealthy behaviours to control their weight, such as skipping meals or crash dieting, even after controlling for *body mass index* and the socioeconomic status [32, 33]. *Peer influences* in body dissatisfaction represent a complex gender issue, as lower peer acceptance, perceived social support, involvement in romantic involvement and friendship intimacy relate to and can magnify poor body image among adolescent females, while dissatisfied boys aim to overcome their problems doing sports [34, 35]. Still, acceptance and social support from friends helps adolescents overcome sociocultural pressures and feel more positively about their bodies by fostering resilience [36, 18]. Currently, there is a growing body of research on two relatively polarised segments- on the one hand; there are malnutrition and starvation behaviours. On the other, the epidemic of over-nutrition or obesity in children and youth. Twin studies suggest that approximately 50% of the tendency towards obesity is inherited, while contributing exogenous factors range from overconsumption of fat-rich diets, excessive use of modern media (television and video-games) and lack of physical activity (sedentary life style) in childhood and adolescence [37]. Among diverse related factors, studies have shown that populations aged 8-18, mostly minority children from low-income families who play video-games or watch TV at least 4,5h a day, are at increased risk for obesity with consequent hypertension, dyslipidaemia, back pain and psychosocial problems [38, 37]. Alarmingly, obese women complete fewer years of school, are less likely to be married (as are obese men), have lower income and higher rates of poverty, with lower socio-economic status that is more likely the consequence than the cause of obesity [39, 40]. On the other side of the spectrum lie the diverse signs and symptoms of *anorexia* and *bulimia*, ranging from excessive weight and muscle loss, gastrointestinal complications and liver damage, cardiovascular, immune, urinary, reproductive and skeletal system complications to fainting, seizures, depression, anxiety, susceptibility to infections, swollen glands and risk of self-mutilation or suicide [2]. Interestingly, studies have shown that up to 60% of people with bulimia have a history of anorexia nervosa- individuals on strict diets often fail to endure which causes voracious bingeing, so they often move back and forth between anorexia and bulimia [2].

Anorexia can occur in children as young as age 7, but the disorder most often begins during adolescence- it usually starts at one of two times, either at age 14 or 18 in mainly white girls, and reaches a secondary peak with individuals in their 40s. Symptoms stem from an abnormal body perception and include calorie intake restrictions, body weight obsession, calorie burn remedies and abusive purging via laxatives, enemas and diuretics. Because anorexic individuals often lie, deny and avoid help, their recovery is most difficult [41]. Some social related risk factors also include professions such as competitive athletes, bodybuilders, gymnasts, actors, models and dancers, but certain stressful life events as well (new school, relationship breakup or family issues). Bulimia symptoms relate to a binge by purging the body of calories that lasts at least twice a week for three months, through a combination of self-induced vomiting, laxative, diuretic or enema abuse, fasting and extreme compulsive exercising [42]. The disorder is rare in children under age 14, with some 85-90% bulimics being female adolescents and college women, that recognize but cannot control their abnormal behaviour. Social risk factors are similar to anorexia nervosa, while biological factors include low levels of serotonin or abnormal levels of *leptin*, a food intake and body weight regulation protein. Hereditary factors aside from genes, include family members or relatives suffering from the disorder, a history of alcoholism, depression and obesity. Psychological factors related are poor impulse control and self-worth, depression, obsessive-compulsive disorder and a proneness to risk behaviour such as crime or substance abuse. Common bulimia symptoms are related to teeth enamel damage (exposure to stomach acid during vomiting), swollen salivary glands, dehydration and sores or calluses on knuckles or hands while inducing vomiting (Russell's signs), dry skin, fatigue and menstrual cycle problems [43]. *Binge eating*, as a separate diagnostic category under consideration, represents an abnormal pattern and loss of control with consummation of significant amounts of food in a limited time, which some experts believe to be a subtype of bulimia. The difference from a bulimic is in that binge eaters do not purge after such an episode. Typical binge eater traits are impulsiveness, frequent dieting, depression and low self-esteem, anger management control and preoccupation with body image and weight. Unlike anorexia or bulimia, which start in the teenage or young adult years, binge eating disorder is likely to occur in adults between the ages of 46 and 55. Although binge eaters may be of normal weight, binge eating is common among obese people,

as well [2]. Factors causing binge eating range from genetic predisposition, neurotransmitter abnormalities, substance abuse to family, job or relationship related stress. Recently, new separate disorder types arose, such as the purge disorder, anorexia athletica, rumination syndrome, pica, Prader-Willi syndrome and orthorexia nervosa [see 2, 3, 43].

3. METHOD

3.1. Research Aim

The aim of this research was to examine the frequency of eating disorders among adolescents with special focus on the significance of sociodemographic traits, depression as well as family and peer relations.

3.2. Hypotheses

Based on the research aim, the following hypotheses were established:

H1: *socioeconomic traits are significant in relation to adolescent eating disorders*

H2: *family relations and peer support present protective factors in relation to eating disorders*

H3: *depression is significant in eating disorders aetiology*

H4: *eating disorders comorbidity and positive correlation is expected*

3.3. Instrument

A 3-part questionnaire was constructed for the purpose of this research. Adapted standardised instruments for eating disorders were implemented. The *first part* consisted of 6 general questions concerning socioeconomic traits (1. Age, 2. Gender, 3. School type, 4. School success [grade point average, GPA]), 5. Father's educational level, 4. Mother's educational level, 6. Family configuration). The *second part* of the questionnaire consisted of 2 graphic evaluation scales: the first evaluated the current and desired body image on a scale from extremely thin, normal to obese characters [44]; and the second image evaluated specific body parts dissatisfaction for boys and girls [89]. The third part had 5-item Likert scale agreement statements (1-never; 2-rarely; 3-sometimes; 4-often; 5-always). It was adapted from Eating Disorder Inventory (EDI) [45], Eating Attitude Test (EAT) [46], Bulimia Test (BULIT) [47] and the Düsseldorf

Orthorexia Scale (DOS) [48]. It consisted of scales on: a) family life quality; b) peer relations quality; c) depression; and d) eating disorders: anorexia, bulimia, binge eating and orthorexia. Composite variables were formed, with high reliability analysis scores. The family relations variable ($\alpha=.84$), the peer relations variable ($\alpha=.76$), the depression variable ($\alpha=.91$), and the eating disorder variables: anorexia ($\alpha=.70$), bulimia ($\alpha=.75$), binge eating ($\alpha=.80$) and orthorexia ($\alpha=.80$) with satisfactory Cronbach's alpha coefficients.

3.4. Procedure

The research was conducted in early 2018 with high school students in the city of Osijek, Croatia. All participants were informed about the research goals and were guaranteed complete anonymity in line with the *Ethical Code of Research with Children* (2003). After written consent was obtained from the participants and their parents, a paper survey was administered in schools during regular school activities. The results were analysed using SPSS Advanced Statistics (version 20) with descriptive statistics, *t* test for independent samples, correlation and linear regression analysis.

4. RESULTS AND DISCUSSION

4.1. Sample Characteristics

The research was conducted with 218 adolescent participants aged 14 to 19. There were 74 male (33.9%) and 144 female (66.1%) participants from gymnasiums (N=62; 28.4%) and vocational schools (N=156; 71.6%). Their average school success was 4.17, with 1 sufficient (0.5%), 20 good (9.2%), 138 very good (63.3%) and 59 excellent pupils (27.1%). The participants' parents were mostly averagely educated-3 (1.4%) fathers did not finish elementary education, 9 fathers (4.1%) had elementary education, 142 (65.1%) were high school graduates, 24 (11%) had higher education and 40 (18.3%) were highly educated. The mother's education analysis showed 13 (6%) mothers had elementary education, 129 (59.2%) had high school education, 22 (10.1%) higher education and 54 (24.8%) were highly educated. Participants reported living with both their parents (N=166; 76.1%), their mother (N=37; 17%), their father (N=10; 4.6%), grandparents (N=4; 1.8%) and alone (N=1; 0.5%).

The descriptive analysis on current and desired body types for female (Figure 1) and male (Figure 2) participants demonstrated that only 33.5% (N=73) of

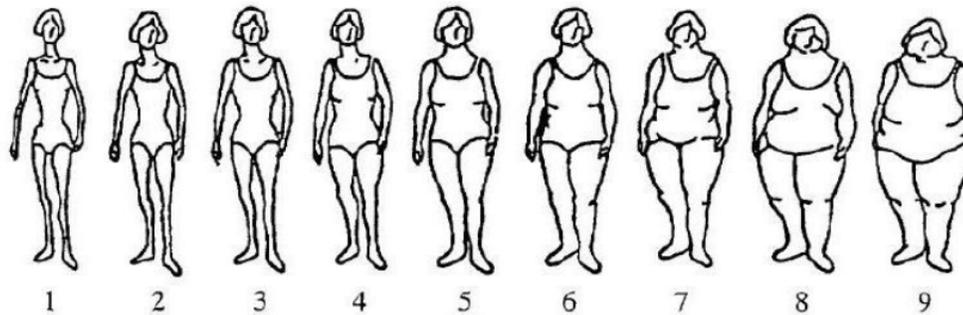


Figure 1: Current and desired body type scale for females (No. 4 represents a normal body image).

Table 1: The Descriptive Statistics on the Current Physical Appearance

		Current physical appearance evaluation								Σ
		1	2	3	4 (normal)	5	6	7	8	
Male	N	2	7	17	32	8	6	1	1	74
	%	0,9	3,2	7,8	14,7	3,7	2,8	0,5	0,5	33,9
Female	N	3	35	32	41	26	4	3	0	144
	%	1,4	16,1	14,7	18,8	11,9	1,8	1,4	0	66,1
Σ	N	5	42	49	73	34	10	4	1	218
	%	2,3	19,3	22,5	33,5	15,6	4,6	1,8	0,5	100

them evaluate their current body type as normal, 44.1% (N=96) evaluate their body type as thinner and 22.5% (N=49) see themselves as overweight. While evaluating their current body type, all but the last (morbidly obese) presented body image were selected by at least one participant, ranging from 1- the anorexic type, to 8- the highly obese type (Table 1).

Interestingly, when evaluating their desired body type, 37.6% (N=82) participants chose the normal type, while 52.6% (N=115) chose the thinner body type, and only 9.6% (N=21), among whom predominantly male participants, mostly preferred the larger or more muscular body type image (No. 5). These results are in line with recent findings [92]. As expected, the overweight body types ranging from 7-9 were not

desired neither by female, nor by male participants (Table 2). Body image dissatisfaction is a „normative discontent” recognised as a prevalent issue, especially in women [49] and adolescent girls who wish to be thinner [50, 24, 91]. Research has implicated adolescent body dissatisfaction as a risk factor for subsequent lower self-esteem, decreased psychological well-being, increased eating disorder symptomatology, dieting behaviours, obesity and depression [51, 52].

Girls reported most dissatisfaction with the abdominal region (77.1%), thighs (47.2%) and breasts (24.3%). Boys reported most dissatisfaction with the abdomen (36.4%), chest (29.7%) and legs/calves (21.6%) (Figure 3). Previous studies, which used

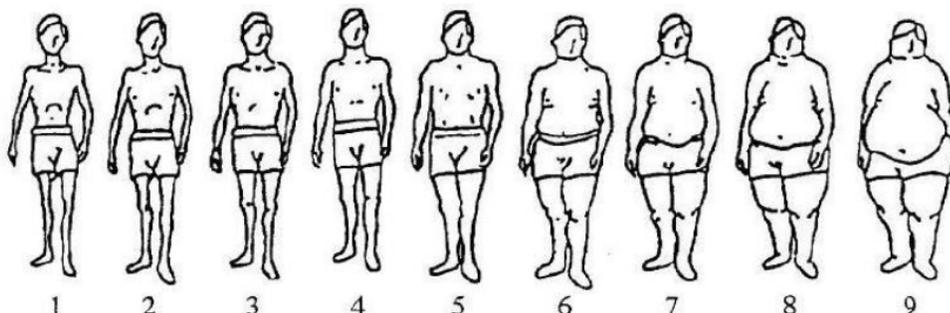


Figure 2: Current and desired body type scale for males (No. 4 represents a normal body image).

Table 2: The Descriptive Statistics on the Desired Physical Appearance

		Desired physical appearance evaluation						Σ
		1	2	3	4 (normal)	5	6	
Male	N	0	3	10	43	17	1	74
	%	0	1,4	4,6	19,7	7,8	0,5	33,9
Female	N	3	43	56	39	2	1	144
	%	1,4	19,7	25,7	17,9	0,9	0,5	66,1
Σ	N	3	46	66	82	19	2	218
	%	1,4	21,1	30,3	37,6	8,7	0,9	100

images to assess adolescents' satisfaction with their body, found that adolescent girls, in comparison with adolescent boys, report greater difference between assessment of current and the desired appearance [53, 54, 91]. Moreover, several research studies reported significant decrease in body dissatisfaction among boys in adolescence, in contrast to girls who showed significant increase in body dissatisfaction [55, 56]. Previous research studies also have determined that adolescent girls are dissatisfied mostly with their middle or lower body, such as hips, buttocks, stomach and thighs, which are body parts that grow and extend during puberty and, therefore, move adolescents' girls' bodies away from the ideal societal female body type [57]. The reason why adolescent boys report dissatisfaction with upper body could be that the ideal male body type includes broad shoulders and a narrow waist, rather than a thinness oriented body type [58].

significance for eating disorders, depression or family and peer relations quality ($p > .05$). The mother's educational level was significant for anorexia and orthorexia ($p < .05$), similar to reports by Bakalar *et al.* [94]. Previous research among Sweden males and females claims that incidence of eating disorders in females was predicted by higher educational level among the father and mother, while parent social class and parental income showed little or no effect [59]. Among males, the same pattern was seen only in anorexia nervosa, while other eating disorders showed no association with parental education and an inverse association with parental income [59]. On contrary, Swanson and Crow found that measures of socioeconomic status, including parental education, household income, and parental marital status, were not significantly associated with any eating disorder [60].

The t-test for differences in relation to the father's educational level and family structure established no

Our results show significant gender differences on depression ($p < .001$), anorexia ($p < .01$), bulimia ($p < .001$)

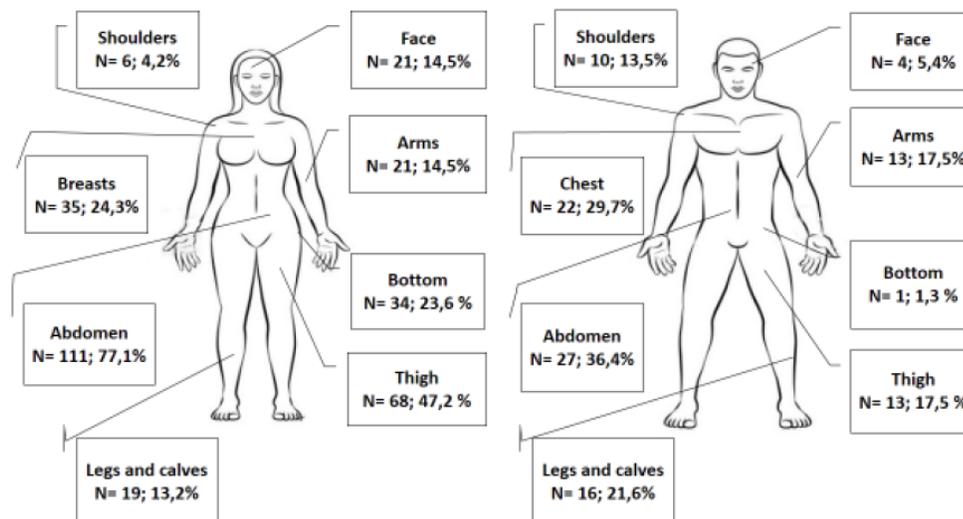


Figure 3: Overview of results on adolescent body image dissatisfaction (N=218; Nf=144, Nm=77).

Table 3: T-Test for Gender Differences

Variable	Gender	N	M	SD	t
Family relations quality	M	74	27,34	5,37	1,33
	F	144	26,33	5,26	
Peer relations quality	M	74	20,43	3,33	-,54
	F	144	20,68	3,17	
Depression	M	74	9,26	4,02	-5,36***
	F	144	12,79	4,89	
Anorexia	M	73	12,74	4,22	-3,04**
	F	144	14,70	4,63	
Bulimia	M	74	9,89	3,45	-4,85***
	F	144	12,63	4,18	
Binge eating	M	74	8,47	3,52	-2,16*
	F	144	9,68	4,09	
Orthorexia	M	74	10,19	4,78	1,75
	F	144	9,20	3,43	

Note: $p < ,001***$; $p < ,01**$; $p < ,05*$.

and binge eating ($p < .05$), with girls reporting higher results on all scales (Table 3). There were no differences in family relations, peer relations quality and orthorexia. Higher incidence of anorexia, bulimia and binge eating among female adolescents has been found in several research studies [61, 62, 63, 91]. However, results are ambivalent, as previous research studies found opposite results regarding the prevalence

of orthorexia. While some research studies found higher orthorexic tendencies among males [64, 65], others established higher orthorexic tendencies among females [66, 67]. Age was significant for depression ($p < .05$) in younger participants, while orthorexia ($p < .05$) was significant for older adolescents. Donini *et al.* [68] confirmed increased orthorexic tendencies following maturation among adolescents. Rohde *et al.* [93] found

Table 4: T-Test on School Type Differences

Variable	School type	N	M	SD	t
Family relations quality	Gymnasium	62	24,82	5,71	-3,31**
	Vocat. school	156	27,40	4,98	
Peer relations quality	Gymnasium	62	20,42	3,43	-,51
	Vocat. school	156	20,67	3,14	
Depression	Gymnasium	62	14,24	5,59	5,34***
	Vocat. school	156	10,54	4,17	
Anorexia	Gymnasium	62	14,31	5,13	,54
	Vocat. school	155	13,94	4,36	
Bulimia	Gymnasium	62	13,15	4,92	3,31**
	Vocat. school	156	11,13	3,66	
Binge eating	Gymnasium	62	10,59	4,87	3,19**
	Vocat. school	156	8,74	3,39	
Orthorexia	Gymnasium	62	10,23	4,26	1,63
	Vocat. school	156	9,26	3,81	

Note: $p < ,001***$; $p < ,01**$; $p < ,05*$.

that risk factors for eating disorder onset double between the age of 13 and 14. Interestingly, our research did not establish significant age differences in behaviours related to anorexia, bulimia and binge eating, which is explained by the peak incidence of the aforementioned eating disorders, most prevalent in the age range from 14 to 19 [69, 70], which mostly corresponds to the age group of the respondents in our study.

Participants from vocational schools report significantly higher family relations quality ($p < .01$), while adolescents from gymnasiums report significantly higher depression ($p < .000$), bulimia ($p < .01$) and binge eating behaviour ($p < .01$) (Table 4). These results are in line with previous research among Croatian adolescents, which indicate that adolescents from gymnasiums are more likely to engage in eating disorders than adolescents from vocational schools [71]. Recent studies in Sweden show that school environments are associated with eating disorders—girls who attend schools with a higher proportion of females, and children of highly educated parents as well, are more likely to develop eating disorder [72].

4.2. Correlation Analysis

Eating disorders show high positive mutual correlative comorbidity ($p < .000$), and were significantly positively correlated to depression ($p < .000$). Similar research with 2436 female inpatients established a high level of comorbidity with all types of eating disorders, with 97% patients reporting comorbid eating behaviours, and around 80% of anorexic and bulimic participants suffering from major depression [89]. Our sample's family relations correlated negatively with bulimia and binge eating, but positively with orthorexia. Peer relations quality correlated negatively with depression, but were not significant for eating disorders (Table 5).

4.3. Regression Analysis for Eating Disorders

Our results show that bulimia ($\beta = .62, p < .001$), orthorexia ($\beta = .32, p < .001$), depression ($\beta = .26, p < .01$) and mother's education ($\beta = .25, p < .01$) represent the most significant positive predictors for anorexia (Table 6). Other predicting variables were gender, family relations quality and school type, as anorexia is predicted for girls from vocational schools who report more family life satisfaction and have more educated mothers (Table 6), similar to reports by Bakalar *et al.* [94]. A total of 59.3% of variance for anorexia was explained. Risk factors for the onset of anorexia have been studied in numerous research. Female gender is recognized as the most important risk factor for developing eating disorders such as anorexia, bulimia and binge eating [73]. Stice and Gau [74] found that low body mass index, low dieting, negative affect, and functional impairment predicted onset of anorexia. Other risk factors included low self-esteem, internalization of thin-ideal, dietary restraint, mood and anxiety disturbances [75, 76]. While some studies claim that depression is directly linked to the food restraints and starvation associated with anorexia, others indicate that depression predicts onset of anorexic behaviour [77, 93]. A number of studies examined family relationships among adolescents with anorexia and found contradictory results. Some studies describe families of adolescents with anorexic behaviour as overprotective [78] and as families with problematic and mixed communication [79]. Other studies have not shown expected problems in family functioning among families of adolescents with anorexia [80]. Since problems in family functioning and in relationships among family members are not unique to eating disorders [77], research suggest that behaviours among family members such as problematic eating behaviours and criticizing adolescent appearance are more related to disturbed eating habits and eating disorders [81, 82].

Table 5: Correlation Analysis Matrix

Variable		AN	BN	BED	ORT	FRQ	PRQ	DEP
Anorexia nervosa	<i>r</i>	-	,66***	,46***	,40***	,05	-,03	,19**
Bulimia nervosa	<i>r</i>	,66***	-	,69***	,10	-,18**	-,09	,48***
Binge eating	<i>r</i>	,46***	,69***	-	,08	-,15*	,01	,36***
Orthorexia	<i>r</i>	,40***	,10	,08	-	,16*	-,03	-,07
Family relations quality	<i>r</i>	,05	-,18**	-,15*	,16*	-	,23**	-,44***
Peer relations quality	<i>r</i>	-,03	-,09	,01	-,03	,23**	-	-,34***
Depression	<i>r</i>	,19**	,48***	,36***	-,07	-,44***	-,34***	-

Note: $p < .001$ ***; $p < .01$ **; $p < .05$ *.

Table 6: Regression Analysis for Anorexia (N= 218)

Anorexia	Model 1 (Soc-dem. characteristics)			Model 2 (Risk-protective factors)			Model 3 (Eating disorders)		
	B	SE(B)	β	B	SE(B)	β	B	SE(B)	β
Age	-.02	,19	-.01	-.02	,19	-.01	-.21	,13	-.07
Gender	2,05	,67	,21**	1,36	,70	,14	,63	,49	,07
School type	,34	,37	,07	,53	,39	,11	,85	,27	,17**
School success	,71	,54	,09	,79	,53	,10	,71	,37	,09
Father's education	-.34	,40	-.06	-.54	,39	-.10	-.32	,28	,10
Mother's education	1,08	,37	,22**	1,21	,36	,25**	,49	,25	,10
Family relations quality				,15	,06	,17*	,08	,04	,09
Peer relations quality				,03	,10	,02	,01	,07	,01
Depression				,24	,08	,26**	-.04	,06	-.04
Bulimia							,69	,08	,62***
Binge eating disorder							,06	,07	,05
Othorexia							,37	,06	,32***
R²	,088			,136			,593		
R Square Change	,088			,048			,457		
F for change in R²	3,39**			3,81**			76,36***		

Note: $p < .05^*$; $p < .01^{**}$; $p < .001^{***}$.

The regression analysis for bulimia established anorexia ($\beta = .46$, $p < .001$), binge eating ($\beta = .39$, $p < .001$), depression ($\beta = .45$, $p < .001$) and gender ($\beta = .30$, $p < .001$) as the most significant positive predictors (Table 7). Other predicting variables were school type and mother's education, as bulimia is predicted for girls from gymnasiums who have more educated mothers (Table 7). A total of 69.6% of variance for bulimia was explained. In previous research, thin-ideal internalization, positive expectancies for thinness, body dissatisfaction and dieting, overeating, fasting, and mental health care predicted the onset of bulimia [74]. Moreover, engaging in weight-loss diet and negative affect resulted in bulimic symptoms among adolescents [83, 84], which can be explained with replacing negative emotions by less negative emotions of guilt that follow a binge episode, thus rendering it less painful for adolescents to binge and feel guilty than experience negative affect [85]. When measuring socioeconomic status, some studies indicate that the incidence of bulimia in females was predicted by parents' higher educational level [59].

Our results show that bulimia ($\beta = .63$, $p < .001$), depression ($\beta = .37$, $p < .01$) and school type ($\beta = -.19$, $p < .05$) represent the most significant positive predictors for binge eating (Table 8). Other predicting variables were gender and peer relations satisfaction, as binge

eating is predicted for girls from gymnasiums who report more peer relations quality (Table 8). A total of 50.9% of variance for binge eating was explained. Souza da Silva *et al.* [86] reported that women and adolescent girls had a higher probability of experiencing recurrent binge-eating episodes than men. A number of studies provides evidence that body dissatisfaction, BMI, negative affect and tendency to emotional eating increase the risk for engaging in binge eating [36, 95]. Negative affect is also related to binge eating, as negative mood may trigger binge eating, and eating might moderate negative emotions temporarily [85, 93, 95]. Peer relations quality is defined as a risk and protective factor in the aetiology of eating disorders. While some researchers note that better relationships with peers reduce the risk of developing eating disorders [35, 36], Croll *et al.* [87] state that the prevalence of eating disorders is greater among those girls that perceive their relationships with peers as supportive. This is explained as part of adolescent conformity to the thin body ideal norm with the goal of peer acceptance, as peers are more supportive to adolescents who already engaged in disordered eating behaviours.

The regression analysis for orthorexia established anorexia ($\beta = .56$, $p < .001$), family relations quality ($\beta = .19$, $p < .05$), mother's education ($\beta = .15$, $p < .05$) and

Table 7: Regression Analysis for Bulimia (N= 218)

Bulimia	Model 1 (Soc-dem. characteristics)			Model 2 (Risk-protective factors)			Model 3 (Eating disorders)		
	<i>B</i>	<i>SE(B)</i>	β	<i>B</i>	<i>SE(B)</i>	β	<i>B</i>	<i>SE(B)</i>	β
Age	,12	,17	,47	,15	,16	,06	,05	,10	,02
Gender	2,64	,59	,30***	1,49	,58	,17*	,77	,39	,09*
School type	-,78	,32	-,17*	-,21	,32	-,05	-,33	,21	-,07
School success	-,44	,47	-,06	-,36	,44	-,05	-,46	,29	-,07
Father's education	-,11	,35	-,02	-,25	,33	-,05	,03	,22	,01
Mother's education	,52	,33	,12	,64	,30	,14*	-,03	,20	-,01
Family relations quality				,03	,05	,04	-,03	,04	-,03
Peer relations quality				,05	,08	,04	-,04	,06	-,03
Depression				,38	,07	,45***	,15	,05	,17***
Anorexia							,42	,05	,46***
Binge eating disorder							,41	,05	,39***
Othorexia							-,09	,05	-,09
<i>R</i>²	,142			,280			,696		
R Square Change	,142			,138			,416		
<i>F</i> for change in <i>R</i>²	5,79***			13,21***			92,89***		

Note: p<,05*; p<,01**; p<,001***.

Table 8: Regression Analysis for Binge Eating (N= 218)

Binge eating	Model 1 (Soc-dem. characteristics)			Model 2 (Risk-protective factors)			Model 3 (Eating disorders)		
	<i>B</i>	<i>SE(B)</i>	β	<i>B</i>	<i>SE(B)</i>	β	<i>B</i>	<i>SE(B)</i>	β
Age	,25	,17	,11	,30	,16	,13	,22	,12	,09
Gender	1,17	,58	,14*	,18	,59	,02	-,81	,47	,09
School type	-,84	,32	-,19*	,35	,32	-,08	-,27	,26	-,06
School success	-,45	,47	-,07	-,36	,44	-,05	-,16	,35	-,02
Father's education	-,05	,35	-,01	-,15	,33	-,03	,03	,26	,01
Mother's education	,44	,32	,11	,54	,31	,13	,11	,25	,03
Family relations quality				,01	,05	,01	-,01	,04	-,02
Peer relations quality				,17	,08	,14*	,14	,07	,11*
Depression				,32	,07	,37***	,08	,05	,09
Anorexia							,06	,07	,06
Bulimia							,59	,07	,63***
Othorexia							-,03	,06	-,03
<i>R</i>²	,081			,184			,509		
R Square Change	,081			,103			,325		
<i>F</i> for change in <i>R</i>²	3,08**			8,75***			45,05***		

Note: p<,05*; p<,01**; p<,001***.

Table 9: Regression Analysis for Orthorexia (N= 218)

Orthorexia	Model 1 (Soc-dem. characteristics)			Model 2 (Risk-protective factors)			Model 3 (Eating disorders)		
	B	SE(B)	β	B	SE(B)	β	B	SE(B)	β
Age	,22	,17	,09	,18	,17	,08	,23	,15	,09
Gender	-,90	,58	-,11*	-,82	,61	-,09	-1,19	,57	-,14*
School type	-,21	,32	-,05	-,41	,34	-,09	-,72	,31	-,17*
School success	,94	,47	,14*	,94	,47	,14*	,48	,32	,03
Father's education	,03	,35	,01	-,09	,35	-,02	,12	,32	,03
Mother's education	,59	,32	,14	,63	,32	,15*	,19	,29	,05
Family relations quality				,14	,06	,19*	,08	,05	,10
Peer relations quality				-,07	,09	-,06	-,07	,08	-,05
Depression				-,01	,07	-,01	-,04	,07	-,05
Anorexia							,48	,07	,56***
Bulimia							-,19	,10	-,19
Binge eating							-,04	,09	-,04
R²	,078			,112			,291		
R Square Change	,078			,034			,179		
F for change in R²	2,95**			2,65*			17,20***		

Note: p<,05*; p<,01**; p<,001***.

school success ($\beta=.14$, $p<.05$) as the most significant positive predictors (Table 9). Other predicting variables were school type and gender, as orthorexia is predicted for boys from gymnasiums who have more educated mothers and report more family life satisfaction (Table 9). A modest 29.1% of variance for orthorexia was explained. Some studies reported that males are being more likely to engage in orthorexic behaviour than females [64, 65], while other showed no significant gender differences [88]. Aksoydan and Camci [88] reported that higher levels of education are related to more orthorexic symptoms, contrary to Donini *et al.* [64] who reported that individuals who had lower education were more likely to suffer from orthorexia symptoms. According to DellOsso *et al.* [90], orthorexic behaviour is more likely among students whose parents reported a lower educational level.

5. CONCLUSION

Our results indicate significant interactions between socioeconomic traits, depression and eating disorders. Eating disorders were highly comorbidly correlated, and significantly positively correlated to depression. A concerning percent of adolescents reported gender specific body image dissatisfaction, mostly related to the abdomen, thigh and chest area, with 52.6% choosing the thinner desired body type. Girls reported

significantly higher depression, anorexia, bulimia and binge eating, while age was a risk factor for depression in younger, and orthorexia in older participants. School type affiliation was ambivalent as a risk factor. While anorexia is predicted for girls from vocational schools who report more family life satisfaction and more educated mothers, bulimia is predicted for girls from gymnasiums with more educated mothers. Binge eating is predicted for girls from gymnasiums who report more peer relations quality, while orthorexia is predicted for boys from gymnasiums who have more educated mothers and report more family life satisfaction. Future research should encompass sociocultural models, further study the mother's role and general media exposure with the goal of providing a more profound understanding of the complex eating disorder aetiology and phenomenology.

6. LIMITATIONS

The present study has certain limitations. The established statistical variation between vocational and grammar schools, or specific gender and age differences, could stem from unequal sample sizes in terms of socio-demographic characteristics. The Cronbach's alpha coefficients were moderate to high in terms of reliability, due to the limited sample size and implementing non-standardised (family, peers,

depression) or adapted standardised survey scales (eating disorders). Additionally, this study design did not evaluate specific adolescent media exposure, use and interests, or parent and peer attitudes on nutrition, which could have provided a solid basis for comparisons between important factors related to eating disorders. A larger sample size could allow conclusions of a more general spectrum and provide a broader understanding of other similar studies.

7. COMPLIANCE WITH ETHICAL STANDARDS

The authors declare that they have no conflict of interest. All research procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and / or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study. A board of expert associates in each school approved the questionnaires beforehand. Prior to implementation, the parents and students were informed and written consent was obtained. The research was conducted according to *The Ethical Standards for Research with Children* (2003).

ETHICAL APPROVAL

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

The research was conducted according to *The Ethical Standards for Research with Children* (2003).

INFORMED CONSENT

Informed consent was obtained from all individual participants included in the study.

COMPLIANCE WITH ETHICAL STANDARDS

The first author, Goran Livazović, declares that he has no conflict of interest.

The second author, Iva Mudrinić, declares that she has no conflict of interest.

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