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ORIGINAL ARTICLE

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Prevalence, correlates and comorbidities of feeding and eating disorders in a nationally representative sample of Iranian children and adolescents

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Abstract

Objective: This study investigated the prevalence of feeding and eating disorders, and identified their correlates and comorbidities among children and adolescents.

Method: We used the nationally representative sample of the Iranian Children and Adolescents' Psychiatric disorders (IRCAP) survey, with 30,532 participants randomly selected by a multistage cluster sampling method. We employed the kiddie schedule for affective disorders and schizophrenia-present and lifetime version (K-SADS-PL) semi-structured face-to-face interview to screen for any psychiatric disorders, including feeding and eating disorders, and associated factors. We used multivariate binary logistic regression to analyze the data.

Results: Valid data from 27,111 participants were analyzed. The total prevalence of feeding and eating disorders among children and adolescents was 0.89 (0.81–1.10). In all types of feeding and eating disorders, the adjusted odds ratio was higher among girls (except binge-eating disorder) and older adolescents but was lower among rural residents. The most common psychiatric comorbidities observed in children and adolescents with feeding and eating disorders were obsessive–compulsive disorder (20.2%), agoraphobia (20.2%), depressive disorder (16.4%), social phobia (10.1%), oppositional defiant disorder (10.1%), generalized anxiety disorder (9.4%), attention deficit hyperactivity disorder (7.5%), and conduct disorder (5.7%), which were significantly more common compared to their peers without feeding and eating disorders.

Discussion: Older age, female gender and living in an urban area are predisposing factors in feeding and eating disorders (in binge-eating disorder, the male gender is a

Abbreviations: AN, anorexia nervosa; BED, binge-eating disorder; BN, bulimia nervosa; DSM, diagnostic and statistical manual of mental disorders; EDNOS, eating disorders not otherwise specified; EAT-26, eating attitudes test-26; IRCAP, Iranian children and adolescents' psychiatric disorders; K-SADS-PL, Kiddie schedule for affective disorders and schizophrenia-present and lifetime version.

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positive correlate). We suggest that future works pay attention to the role of gender, comorbidities and predisposing factors.

KEYWORDS
anorexia nervosa, binge-eating disorder, bulimia nervosa, children and adolescents, comorbidity, Iran, other specified feeding and eating disorders, prevalence

1 | INTRODUCTION

Feeding and eating disorders are distinguished by altered eating behaviors, which result in the disturbance of food intake or food absorption (Eddy & Thomas, 2019; Goyal, Balhara, & Khandelwal, 2012). The main types of eating disorders are anorexia nervosa (AN), bulimia nervosa (BN), binge-eating disorder (BED), and other specified feeding or eating disorders (OSFED) (Bryant-Waugh, 2019; Erskine, Whiteford, & Pike, 2016).

The risk of eating disorders is increased within the age range of 15 to 19 years old. It usually begins during the puberty period but cases of earlier onset have been reported. Additionally, the behavior appears mostly among young females compared to males (Lai, Pang, & Wong, 1995). Genetic and environmental factors are among the most important risk factors of developing eating disorders (Mazzeo & Bulik, 2009).

Eating disorders impose a considerable psychiatric burden to the patient. They may suffer from comorbidities and decreased social functioning. Bipolar mood disorder, depressive disorder, anxiety disorder, obsessive–compulsive disorder, and alcohol use disorder are common comorbidities observed among patients with eating disorders (Buhren et al., 2014). Sometimes the mental pressure on the patient is so high that it may increase the risk of suicide (Bodell, Cheng, & Wildes, 2018; Forcano et al., 2011).

The reports of eating disorders are mostly issued from industrialized western countries. Qian et al. (2013) in a meta-analysis of 15 studies from different parts of the world (mostly from industrialized countries), estimated the lifetime prevalence of AN in adults as 0.21% (95% CI: 0.11–0.38), bulimia nervosa as 0.81% (95% CI: 0.59 to 1.09) and BED as 2.22% (95% CI: 1.78 to 2.76) (Qian et al., 2013).

Much of the epidemiological literature on eating disorders is based on Northern America, Europe and Australia/New Zealand and the populations residing in countries outside those regions are underrepresented in the eating disorders literature. Hence, little information exists from Middle Eastern countries with different cultures, lifestyles, and socioeconomic statuses. Furthermore, it is predictable that the prevalence of feeding and eating disorders may increase, with the growing number of children and adolescents in the population of developing countries (Makino, Tsuboi, & Dennerstein, 2004).

Several studies have been performed on a regional scale in Iran to estimate the prevalence of eating disorders. Most of these studies were school-based (Nobakht & Dezhkam, 2000) or these studies were conducted among specific populations, such as university dormitories or fitness centers (Khabir, Sajjadi, & Aflakseir, 2016), and specific genders (mostly girls) (Jalali-Farahani, Chin, Mohd Nasir, & Amiri, 2015) or among adult populations (Khabir et al., 2016). Additionally, most of them were limited to local populations, and they were not generalizable to the country. Furthermore, most of them were performed using a questionnaire rather than a diagnostic interview. Up to now, there was not any national survey to evaluate the prevalence and comorbidities of feeding and eating disorders in all provinces of Iran. Therefore, we aimed to evaluate the prevalence, correlates and comorbidities of feeding and eating disorders based on kiddie schedule for affective disorders and schizophrenia-present and lifetime version (K-SADS-PL) among Iranian children and adolescents (6 to 18 years old).

2 | METHODS

2.1 | Participants and sampling

We performed this study in the context of the nationally-representative sample of Iranian children and adolescents' psychiatric disorders (IRCAP) survey. This study was a cross-sectional survey that was designed to be implemented at the household level in all 31 provinces of Iran and aimed to assess the psychiatric disorders among children and adolescents. The sampling was planned for all 31 provinces of Iran. However, this survey did not accomplish in the Ghom province, due to logistic problems. Therefore, we randomly selected 33,264 children and adolescents from other 30 provinces by multistage cluster sampling and we invited them to take part into this survey. However, 2,732 children and adolescents refused to participate or could not participate (response rate: 91.78%). Finally, 30,532 participants consented to involve in the IRCAP survey (Figure 1).

We randomly selected the children and adolescents (6-18 years) across the country by multistage cluster sampling with equal blokes of sex and age-group in each cluster. First, 170 clusters were randomly selected

according to postal code. Then, in each cluster, we randomly selected six cases with permuted block method with equal blocks of age and gender (two gender blocks of boy and girl with equal distribution of three age groups of 6–9, 10–14, and 15–18 years). This way, bout 1,000 participants were randomly selected from each province. The full study design and methodology including sampling is described in the protocol article (Mohammadi, Ahmadi, Kamali, Khaleghi, & Ahmadi, 2017; Mohammadi et al., 2019).

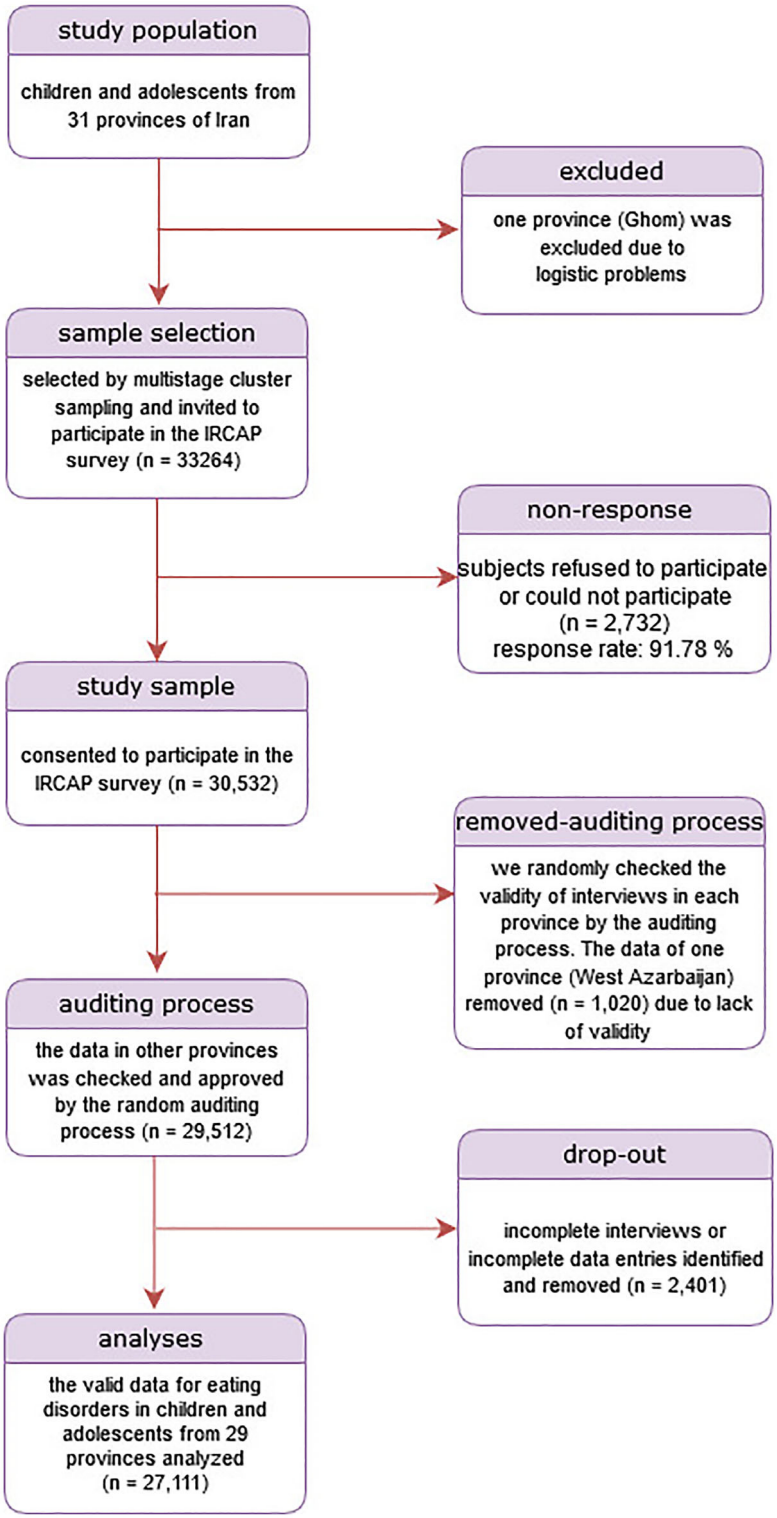

FIGURE 1 Flow diagram of the study

TABLE 1 The DSM-5 criteria for the diagnosis of feeding and eating disorders and their availability in the KSADS-PL IV

		DSM-5 criteria	The criteria available in KSADS-PL IV
Anorexia nervosa		A. "low body weight"	Yes
		B. "intense fear of gaining weight or becoming fat"	Yes
		C. "disturbances in self-perception of weight and shape"	Yes
		(removed criteria)	Amenorrhea/yes
Bulimia nervosa		A. "recurrent episodes of binge eating" 1. Binge eating attacks 2. Sense of lack of control	 Yes Yes
		B. "Recurrent inappropriate compensatory behavior in order to prevent weight gain"	Yes
		C. "Episodes occur, on average, at least once a week for 3 months"	Yes
		D. "Self-evaluation is unduly influenced by body shape and weight"	Yes
		E. "The disturbance does not occur exclusively during episodes of anorexia nervosa"	Yes
Binge-eating disorder		A. "Recurrent episodes of binge eating" 1. Binge eating attacks 2. Sense of lack of control	 Yes Yes
		B. "The binge-eating episodes are associated with three (or more) of the following: (a) Eating much more rapidly than normal. (b) Eating until feeling uncomfortably full. (c) Eating large amounts of food when not feeling physically hungry. (d) Eating alone because of feeling embarrassed by how much one is eating. (e) Feeling disgusted with oneself, depressed, or very guilty afterward."	Information not available
		C. "Marked distress regarding binge eating is present."	Information not available
		D. "The binge eating occurs, on average, at least once a week for 3 months."	Yes
		E. "The binge eating is not associated with the recurrent use of inappropriate compensatory behavior as in bulimia nervosa and does not occur exclusively during the course of bulimia nervosa or anorexia nervosa."	Yes
Other specified feeding or eating disorder	Atypical anorexia nervosa	"All the criteria for anorexia nervosa are met, except that despite significant weight loss, the individual's weight is within or above the normal range."	Yes
	Bulimia nervosa (of low frequency and or limited duration)	"All the criteria for bulimia nervosa are met, except that the binge eating and inappropriate compensatory behaviors occur, on average, less than once a week and/or for less than 3 months."	Yes
	Binge-eating disorder (of low frequency and/or limited duration)	"All the criteria for binge-eating disorder are met, except the binge eating occurs, on average, less than once a week and/or for less than 3 months."	All of the criteria for binge-eating disorder (criteria B and C) are not available
	Purging disorder	"Recurrent purging behavior to influence weight or shape (e.g., self-induced vomiting, misuse of laxatives, diuretics, or other medications) in the absence of binge eating."	Yes
	Night eating syndrome	"Recurrent episodes of night eating, as manifested by eating after awakening from sleep or by excessive food consumption after the evening meal. There is awareness and recall of the eating. The night eating is not better explained by external influences such as changes in the individual's sleep–wake cycle or by local social norms. The night eating causes significant distress and/or impairment in functioning. The disordered pattern of eating is not better explained by binge-eating disorder or another mental disorder, including substance use, and is not attributable to another medical disorder or to an effect of medication."	Information not available

2.2 | Inclusion and exclusion criteria

All children and adolescents aged between 6 and 18 years with Persian nationality who dwell in the country for 1 year or above have the inclusion criteria to participate in this survey. Persons who did not consent to participate or could not participate in the interview with any reason were excluded from the study.

2.3 | Study procedure

Two hundred and fifty clinical psychologists with at least the MA degree were sent entire the country to refer to the randomly selected houses and interview with the participants and their parents after obtaining the consent forms. We used the local psychologist interviewers so that they were familiar with local cultures, languages, and dialects of different provinces. Before the study begins the interviewers were trained by the child psychiatrists in the province to perform the semi-structured interview according to the Persian version of K-SADS-PL and DSM diagnostic criteria (Ghanizadeh, Mohammadi, & Yazdanshenas, 2006). Besides, information on demographic data and comorbid disorders were collected.

2.4 | K-SADS-PL

This instrument is the most important valid tool used for diagnosis of the present and lifetime spectrum of psychiatric disorders in children and adolescents. This tool which usually is conducted by a clinical psychologist, can diagnose for the common psychiatric disorders by semi-structured interview with a child or adolescent in collaboration with their parents. This tool includes screening interview and supplements for diagnosis of "depression and bipolar related disorders," "schizophrenia spectrum and other psychotic disorders," "anxiety, obsessive-compulsive and trauma-related disorders," "neurodevelopmental, disruptive, and conduct disorders," "eating disorders and substance-related disorders" (Kaufman, Birmaher, Brent, Ryan, & Rao, 2000). In this article, we used the supplement for the diagnosis of eating disorders. Additionally, we used the other diagnostic supplements of this tool for finding the psychiatric comorbidities of eating disorders. The psychometric properties, reliability and validity of the Persian version of K-SADS-PL are approved in the population of Iran (Ghanizadeh et al., 2006).

2.5 | Classification of eating disorders

In this article, we used the classification of feeding and eating disorders as characterized by the American Psychiatric Association Diagnostic and statistical manual of mental disorders fifth edition (DSM-5). Due to a lack of Persian translation and a validation study of the DSM-5 K-SADS-PL at the beginning of the current study, we used the validated Persian version of DSM-IV K-SADS-PL (Ghanizadeh et al., 2006). Then in the analysis level, we modified the classification of the eating disorders according to the available DSM-5 criteria of feeding and eating disorders (Table 1). In the DSM-5, the BED has been raised from DSM-IV's appendix (Regier, Kuhl, & Kupfer, 2013). Additionally, "amenorrhea" has been removed from the diagnostic criteria of AN in DSM-5 (Call, Walsh, & Attia, 2013). Table 1 shows the K-SADS-IV criteria for the diagnosis of eating disorders and their equivalent DSM-5 criteria for the diagnosis of feeding and eating disorders. Fortunately, the K-SADS IV could validly diagnose for AN and BN which merely match for DSM-5 criteria (except for amenorrhea which we gathered the information but we removed it later from the analysis). However, The K-SADS IV did not provide the full criteria for a diagnosis of "BED." Still, it includes the criteria A1, A2, D, and E (i.e., rule out of BN and AN), and we had gathered them (Table 1). These available criteria cover the essential features of BED. Hence, we decided to report the "participants suspected to have the BED" rather than those with full criteria or its other specified type.

The other specified forms of AN and BN by DSM-5 definition are characteristic symptoms of feeding and eating disorders that cause clinically significant distress or social impairment but do not meet the full criteria for any of disorders (according to DSM-5 the reason why the presentation does not meet the full criteria is needed). In this study we had sufficient information to report some of them. We reported the other specified type of anorexia nervosa for those participants who meet the criteria B and C for AN but not A (i.e., Low body weight) (Table 1). Another name for this

TABLE 2 Present and lifetime prevalence of total feeding and eating disorders in terms of distribution of demographic variables

Socio-demographic characteristics		Total N (%)	With eating disorder			
			Present		Lifetime	
			N (Unweighted %)	Weighted% (95% CI)	N (Unweighted %)	Weighted% (95% CI)
Gender	Boy	13,272 (48.59)	55 (0.41)	0.76 (0.60–0.97)	62 (0.47)	0.83 (0.67–1.05)
	Girl	13,839 (51.41)	62 (0.45)	0.83 (0.66–1.05)	78 (0.56)	1.03 (0.84–1.27)
Age	6–9	9,274 (34.21)	11 (0.12)	0.30 (0.19–0.48)	18 (0.19)	0.40 (0.27–0.60)
	10–14	9,533 (35.16)	38 (0.40)	0.71 (0.53–0.95)	48 (0.50)	0.91 (0.70–1.18)
	15–18	8,304 (30.63)	68 (0.71)	1.48 (1.118–1.86)	74 (0.89)	1.60 (1.29–1.99)
Place of residence	Urban	22,531 (83.11)	111 (0.49)	0.87 (0.73–1.03)	131 (0.58)	1.01 (0.86–1.18)
	Rural	4,580 (16.89)	6 (0.13)	0.22 (0.09–0.56)	9 (0.20)	0.38 (0.18–0.79)
Total		27,111 (100)	117 (0.43)	0.80 (0.68–0.95)	140 (0.52)	0.89 (0.81–1.10)

TABLE 3 Prevalence of subtypes of feeding and eating disorders in children and adolescents in terms of demographic variables

					Other specified			
			Anorexia nervosa	Bulimia nervosa	Atypical anorexia	Bulimia nervosa (of low frequency and/or limited duration)	Purging disorder	Suspected to have binge-eating
Gender	Boy	Unweighted N (%)	1 (0.007)	4 (0.03)	7 (0.05)	15 (0.11)	4 (0.03)	32 (0.24)
		Weighted% (95% CI)	–	0.02 (0.01–0.08)	0.06 (0.03–0.14)	0.17 (0.10–0.28)	0.02 (0.001–0.08)	0.48 (0.36–0.64)
	Girl	Unweighted N (%)	10 (0.07)	8 (0.06)	20 (0.14)	20 (0.14)	5 (0.04)	14 (0.10)
		Weighted% (95% CI)	0.1 (0.06–0.2)	0.1 (0.07–0.23)	0.24 (0.16–0.36)	0.19 (0.12–0.30)	0.07 (0.03–0.15)	0.23 (0.15–0.35)
Age	6–9	Unweighted N (%)	0	1 (0.01)	4 (0.04)	5 (0.05)	2 (0.02)	5 (0.05)
		Weighted% (95% CI)	–	0.05 (0.02–0.1)	0.06 (0.02–0.16)	0.08 (.03–0.19)	0.02 (0.001–0.1)	0.14 (0.07–0.27)
	10–14	Unweighted N (%)	2 (0.02)	2 (0.02)	11 (0.12)	13 (0.14)	3 (0.03)	17 (0.18)
		Weighted% (95% CI)	0.04 (0.01–0.1)	0.06 (0.02–0.2)	0.17 (0.10–0.30)	0.25 (0.15–0.40)	0.03 (0.01–0.11)	0.31 (0.20–0.47)
	15–18	Unweighted N (%)	9 (0.11)	9 (0.11)	12 (0.14)	17 (0.20)	4 (0.05)	24 (0.29)
		Weighted% (95% CI)	0.1 (0.06–0.3)	0.2 (0.08–0.3)	0.23 (0.13–0.40)	0.23 (0.13–0.40)	0.08 (0.03–0.21)	0.66 (0.48–0.92)
Place of residence	Urban	Unweighted N (%)	10 (0.04)	12 (0.05)	23 (0.10)	33 (0.15)	7 (0.03)	46 (0.20)
		Weighted% (95% CI)	0.1 (0.03–0.1)	0.08 (0.05–0.1)	0.15 (0.10–0.22)	0.20 (0.14–0.28)	0.04 (0.02–0.09)	0.39 (0.31–0.50)
	Rural	Unweighted N (%)	1 (0.02)	–	4 (0.09)	2 (0.04)	2 (0.05)	–
		Weighted% (95% CI)	0.05 (0.01–0.03)	–	0.21 (0.08–0.53)	0.05 (0.01–0.29)	0.05 (0.01–0.3)	–
Total		Unweighted N (%)	11 (0.04)	12 (0.04)	27 (0.10)	35 (0.13)	9 (0.03)	46 (0.20)
		Weighted% (95% CI)	0.06 (0.03–0.1)	0.08 (0.05–0.1)	0.16 (0.11–0.23)	0.18 (0.13–0.25)	0.05 (0.03–0.1)	0.36 (0.28–0.46)

TABLE 4 Odds Ratios (95% CI) for feeding and eating disorders in participants

			Univariate		Multivariate	
			OR	CI (95%)	OR	CI (95%)
Anorexia and atypical anorexia	Sex	Male	Base line			
		Female	9.42	(3.12–28.44)**	9.57	3.17–28.88**
	Age group	6–9	Base line			
		10–14	2.74	(0.89–8.45)	2.77	0.89–8.56
		15–18	6.02	(2.08–17.44)**	6.16	2.12–17.85**
	Place of residence	Urban	Base line			
		Rural	0.79	(0.31–2.05)	0.80	0.31–2.03
Bulimia disorder and its other specified forms	Sex	Male	Base line			
		Female	1.96	1.14–3.35*	1.98	1.16–3.93*
	Age group	6–9	Base line			
		10–14	1.87	0.90–3.90	1.87	0.90–3.90
		15–18	2.96	1.46–5.99**	3.02	1.49–6.12**
	Place of residence	Urban	Base line			
		Rural	0.35	0.10–1.26	0.34	0.09–1.22
Suspected to have binge-eating disorder	Sex	Male	Base line			
		Female	0.52	0.30–91*	0.53	0.30–92*
	Age group	6–9	Base line			
		10–14	2.80	1.18–6.63*	2.78	1.17–6.58*
		15–18	4.33	1.89–9.96**	4.28	1.86–9.85**
	Place of residence	Urban	Base line			
		Rural	0.092	0.01–66*	0.091	0.01–0.67*

Note: OR adjusted: Odds Ratio; CI: Confidence Interval; **: $p \leq .01$; * $p \leq .05$.

category is "atypical anorexia" according to DSM-5. We reported the other specified type of bulimia nervosa for those participants who meet the criteria A1, A2, B, D, and E but do not cover the criteria C (i.e., the episode occur less than once a week, and/or less than 3 months) (Table 1). Another name for this category is "bulimia nervosa of low frequency and/or limited duration" according to DSM-5. Additionally, we reported the frequency of purging disorder according to available criteria in K-SADS-PL IV. However, our instrument was unable to evaluate the night eating syndrome (Table 1).

2.6 | Statistical analysis

We reported the prevalence of each of the feeding and eating disorders regarding the age groups, sex, and demographic variables by un-weighted (crude) and weighted percentages. The number of participants that were selected as a sample of this study was equal for all provinces. However, the children and adolescence population were not equal in each province; hence, the data were weighted to represent the population. We used the population weighting adjustment based on the distribution of children and adolescents in each province according to the last national census, by the below formula:

$Wij = (\frac{1}{Pij*1000})/1{,}000.$

Wij: *Weight of individual in each province*;

Pij: *Probability of individual selection in their province*.

Furthermore, odds ratios and their 95%confidence intervals have been analyzed with univariate and then multivariate binary logistic regression. Additionally, the rates of comorbidities of psychiatric disorders in children and adolescents with feeding and eating disorders in comparison with their peers without feeding and eating disorders have been reported.

2.7 | Ethics

The ethics committee board of the National Institute for Medical Research Development (NIMAD) has approved the study protocol (the ethics code of IR.NIMAD.REC.1395.001). If the participants' age was 15–18, both the participants and their parents would ask to sign the informed consent forms. However, if the case was under the 15 years, the informed assent from the child and the written informed consent from one of the parents would be obtained. The cases diagnosed with any psychiatric disorder were referred and treated by the IRCAP's child and adolescent psychiatrist at no cost. Furthermore, we maintained the anonymity of the patients and the confidentiality of the gathered data.

3 | RESULTS

A total of 30,532 children and adolescents aged between 6 and 18 years were screened for feeding and eating disorders and psychiatric comorbidities. During the study, we monitored the interviewers and randomly checked the validity of interviews by performing a large auditing process. We detected a lack of validity in data of West Azarbaijan province (n = 1,020) and decided to remove it. The inter-rater reliability between the interviewers in the remaining sample was approved with a kappa coefficient of 0.91 (p < .001). Furthermore, before we analyze the gathered data, we screened for incomplete interviews or incomplete data entries (n = 2,401) and removed them from the analyses (Figure 1). Finally, we analyzed the valid data from 27,111 children and adolescents (13,272 boys and 13,839 girls). Figure 1 shows the flow diagram of this survey.

Table 2 shows an overview of the prevalence and distribution of total feeding and eating disorders in different layers of age groups, gender, and place of residence. In general, we estimated the weighted prevalence of all feeding and eating disorders to be 0.89 (0.81–1.10). Additionally, these disorders were mostly seen among girls, 15–18 years of age-group, and residents of urban areas (Table 2). Table 3 indicates the prevalence rates of different categories of feeding and eating disorders, it is seen that in all categories, the prevalence rate in girls was higher than that of boys, except for participants suspected to have the BED (0.48% in boys vs. 0.23% in girls) (Table 3). The prevalence rates of all categories of feeding and eating disorders increased with age. This increase was more severe in some categories. For example, in anorexia nervosa and bulimia nervosa, at the end of adolescence, the prevalence rate was ~5 times higher as the beginning of adolescence, while in other disorders this trend was moderately increased (Table 3).

Table 4 shows the odds ratios for feeding and eating disorders and their 95% confidence intervals by univariate and multivariate binary logistic regression. In this table due to low frequency in some categories, we merged the anorexia nervosa with its atypical type, and bulimia nervosa with bulimia nervosa of low frequency and/or limited duration and purging disorder. In all categories of feeding and eating disorders, the adjusted odds ratios were higher in girls (except in those suspected to have the BED), and older adolescents, while the odds ratios were lower among rural residents (Table 4). Table 5 shows rates of comorbidity of psychiatric disorders in children and adolescents with feeding and eating disorder. About 45.6% of participants diagnosed with feeding and eating disorders had no other psychiatric comorbidity, 27.7% had one other psychiatric comorbidity, 10.6% had two comorbidities and 16.1% had three or more psychiatric comorbidities. Furthermore, the comorbidity rates were compared to the participants without feeding and eating disorders by the chi-square test and presented in Table 5. Obsessive–compulsive disorder,

TABLE 5 Comorbidity rates of the psychiatric disorders, mental retardation, epilepsy and smoking in participants with feeding and eating disorders and comparison with those without feeding and eating Disorders

		Weighted%			
Psychiatric disorders	N(%)	Participants with feeding and eating disorder (95% CI)	Participants without feeding and eating disorder (95% CI)	Chi-square	p-value
Depression disorder	18 (12.86)	16.46 (11.49–23.02)	1.70 (1.51–1.91)	180.44	<.001
Bipolar I disorder	2 (1.43)	0.63 (0.11–3.49)	0.17 (0.12–0.25)	0.172	.679
Bipolar II disorder	3 (2.14)	0.63 (0.11–3.49)	0.29 (0.22–0.38)	0.619	.432
Panic	3 (2.14)	1.27 (0.35–4.50)	0.14 (0.09–0.21)	6.538	.011
Separation anxiety disorder	18 (12.86)	8.86 (5.35–14.32)	5.24 (4.91–5.59)	3.415	.065
Social phobia	14 (10.00)	10.13 (6.33–15.82)	1.64 (1.46–1.84)	61.939	<.001
Agoraphobia	26 (18.57)	20.25 (14.72–25.19)	5.08 (4.76–5.42)	69.820	<.001
Generalized anxiety disorder	16 (11.43)	9.49 (5.84–15.07)	2.53 (2.30–2.78)	27.333	<.001
Obsessive compulsive disorder	22 (15.71)	20.25 (14.72–25.19)	3.47 (3.20–3.76)	121.298	<.001
Post-traumatic stress disorder	4 (2.86)	1.90 (0.65–5.43)	0.52 (0.42–0.64)	3.294	.070
Enuresis	6 (4.29)	3.16 (1.36–7.19)	5.33 (5.00–5.68)	1.061	.303
Attention deficit hyperactivity disorder	11 (7.86)	7.59 (4.39–12.80)	3.87 (3.59–4.17)	4.927	.026
Conduct disorder	7 (5.00)	5.70 (3.03–10.47)	0.68 (0.57–0.82)	47.543	<.001
Oppositional defiant disorder	19 (13.57)	10.13 (6.33–15.82)	3.73 (3.45–4.03)	15.864	<.001
Tick	5 (3.57)	1.27 (0.35–4.50)	1.55 (1.37–1.75)	0.084	.771
Mental retardation	2 (1.43)	0.63 (0.11–3.49)	1.19 (1.04–1.37)	0.074	.776
Epilepsy	5 (3.57)	2.53 (0.99–6.33)	1.71 (1.52–1.92)	0.229	.632
Smoking	10 (7.14)	6.33 (3.47–11.26)	2.72 (2.48–2.98)	6.350	.012
Total comorbidity with psychiatric disorders*	74 (52.86)	54.43 (46.65–62.00)	22.82 (22.19–22.46)	86.245	<.001

Note: *Without smoking, mental retardation and epilepsy.

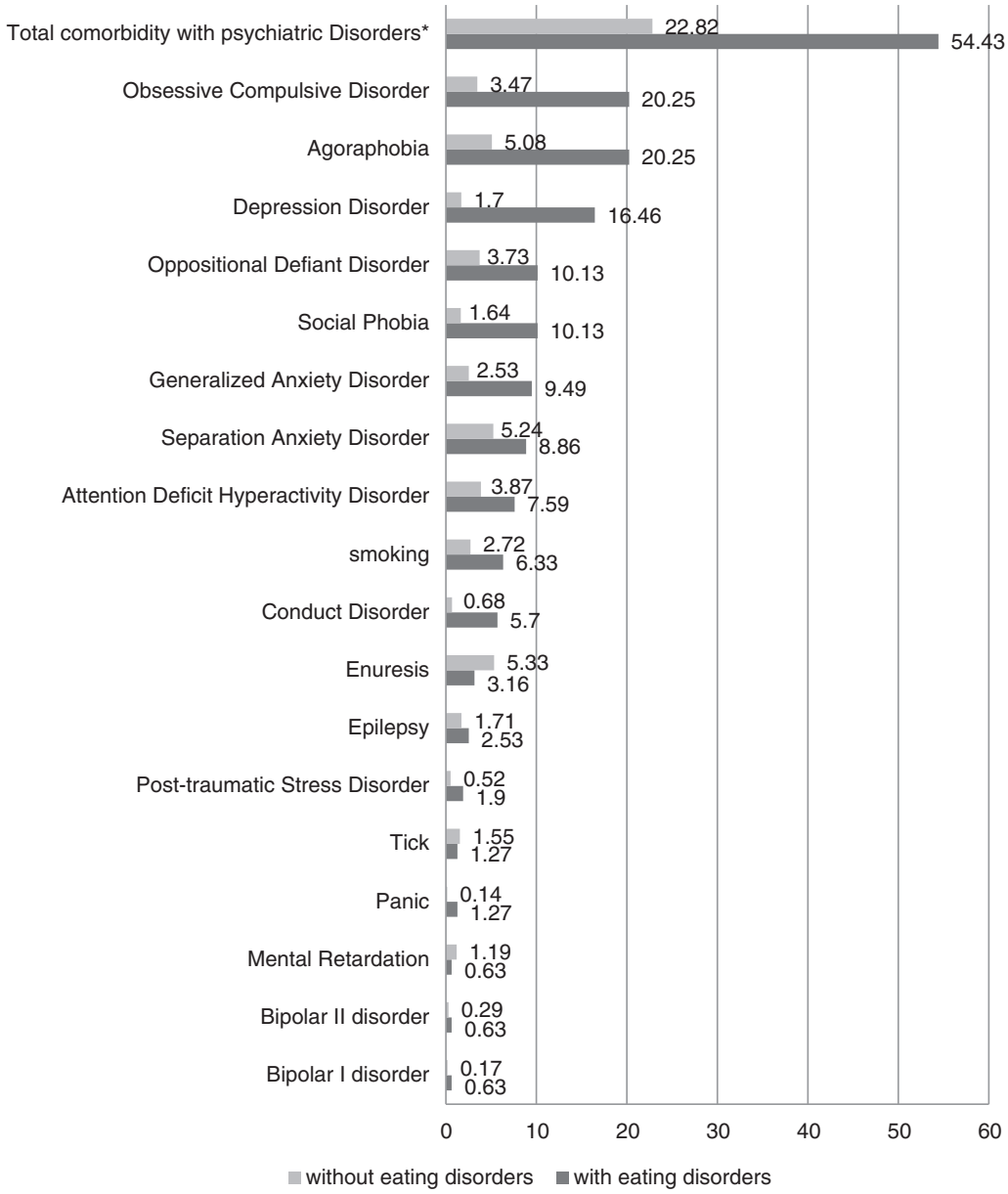

FIGURE 2 Rates of comorbidities of psychiatric disorders, mental retardation, epilepsy, and smoking in children and adolescents with and without feeding and eating disorders

agoraphobia, depression disorder, social phobia, oppositional defiant disorder, generalized anxiety disorder, attention deficit hyperactivity disorder, panic disorder, and conduct disorder were significantly higher among children and adolescents with feeding and eating disorders compared to their peers without feeding and eating disorders. Figure 2 illustrates the comorbidity of psychiatric disorders in children and adolescents with and without feeding and eating disorders.

4 | DISCUSSION

The current article is an update to the partially report of DSM-IV psychiatric disorders including just anorexia nervosa and bulimia nervosa from IRCAP survey (Mohammad Reza Mohammadi et al., 2019). Classifications and diagnostic criteria for feeding and eating disorders in DSM-5 are changed. For example amenorrhea is removed from the diagnostic criteria of anorexia nervosa. BED has emerged and OSFED category has been modified. Hence, due to a lack of new information about feeding and eating disorders in Iran, we decided to modify our database according to the DSM-5 criteria and prepare the current article focusing only on feeding and eating disorders. Due to inclusive characteristic of the DSM-5 categories, number of patients in AN category is increased and BED and OSFED categories are added which cause the comorbidity table to be detailed and different from the comorbidities reported previously. Furthermore, we have compared the comorbidities in diagnosed participants with the participants without feeding and eating disorders.

In this survey, the overall prevalence of DSM-5 feeding and eating disorders is estimated to be 89 in every 10,000 children and adolescents. Nobakht and Dezhkam (2000) in Tehran reported 0.9% anorexia nervosa, and 3.2% bulimia nervosa (Nobakht & Dezhkam, 2000). Peláez Fernández, Labrador, & Raich, (2007) in Madrid reported 2.29% bulimia nervosa and 0.33% anorexia nervosa among girls and 0.16% bulimia nervosa and 0.00% anorexia nervosa among boys (Pelaez Fernandez, Labrador, & Raich, 2007). Swanson, Crow, Le Grange, Swendsen, and Merikangas (2011), in the US reported 0.3% anorexia nervosa, 0.9% bulimia nervosa, and 1.6% BED (Swanson et al., 2011). In our study, the reported prevalence estimates are relatively lower even in the 15–18-year age group. We reported 0.1% for anorexia nervosa, 0.2% for bulimia nervosa, 0.23% for atypical anorexia, 0.23% for bulimia of low frequency and/or limited duration, 0.08% for purging disorder, and 0.66% for BED in 15–18 years old subgroup.

Jalali-Farahani et al. (2015) studied disordered eating by Eating Attitudes Test-26 (EAT-26) among 465 adolescents 14 to 16 years old in high schools of Tehran (Jalali-Farahani et al., 2015). The prevalence of disordered eating was 26.4% among girls and 11.8% among boys. Naeimi, Haghighian, Gargari, Alizadeh, and Rouzitalab (2016) using the EAT-26 among 430 university students in Tabriz have reported 9.5% of total disordered eating (7.5% in men and 10.5 in women) (Naeimi et al., 2016). The discrepancy in results of these studies compared to each other and ours were due to different methodologies, study tools, and or sampling. We used one of the most important valid diagnostic tools for diagnosis of psychiatric disorders including eating disorders across the country in a large scale sample size and multistage cluster sampling method rather than the most commonly used method, a simple questionnaire in local schools, which is not well generalized to the total population.

In another study, Rauof, Ebrahimi, Asghari Jafarabadi, Malek, and Kheiroddin (2015) investigated the prevalence of eating disorders among 1990 student boys and girls (13–18 years) selected by multistage random sampling in Urmia and Tabriz, using EAT-26. They reported 0.0% AN in boys, and 1.3% in girls, 0.1 BN in boys, and 1.4% in girls and 0.3 EDNOS in boys, and 1.7 in girls. The overall prevalence of disordered eating among adolescents in the northwest of Iran was 0.25% (Rauof et al., 2015). Their results were similar to our findings. This similarity is expected as they also used a multistage random sampling from their target population.

Garrusi and Baneshi (2012) in a community-based study at the household level in Kerman province evaluated 1,204 participants aged between 14 and 55 years by eating disorder diagnostic scale (EDDS). They reported 0.8% anorexia, 6.2% bulimia, and 30% sub-threshold binge-eating (Garrusi & Baneshi, 2012). The sampling method in Garrusi and Baneshi (2012) study was similar to our study. One of the differences was that we have performed the K-SADS-PL diagnostic interview but they have used EDDS, also the sample size in our study was selected from the entire country rather than one province. The other reason for differences in the reported prevalence rates is that we have performed our study among children and adolescents but Garrusi and Baneshi (2012) studied eating disorders among adolescents and adult population. As we know, eating disorders may occur mostly near the puberty period and more prevalent among the adult population compared to children. In all, the prevalence rates in our study are lower than in previous studies. Alike most previous studies, the prevalence rates in our study are also increased by age. So that, the prevalence rate increases to 160 in every 10,000 adolescents among 15–18-year-old individuals. We know that adolescence is a critical period for the incidence of eating disorders. The hormonal changes during puberty may be responsible for this rise in the prevalence of feeding and eating disorders among adolescents (Klump, 2013).

Khabir et al. (2016) in Shiraz evaluated the prevalence of feeding and eating disorders among 946 adult women (mean age = 24 years) referring to fitness centers (Khabir et al., 2016). They assessed the participants by asking them to fill the EDDS and calculating their BMI. Again in contrast to our study, they reported a high prevalence rate. One reason for this may be that we used the diagnostic interview rather than a simple questionnaire. Additionally, the age category in our study is wide from 6 to 18 years and eating disorders are mostly occurring near puberty. Additionally, Khabir et al. (2016) like the most previous researchers, have only studied eating disorders in the female participants. This may be due to a biased belief that eating disorders are mostly seen among girls. However, our study was a national population-based study performed following diagnostic interview according to DSM criteria and generalizable to both genders between ages 6 and 18 in all provinces of Iran. In conclusion, the differences observed between the prevalence rates in different studies may be due to different study tools, sample size, and study population (i.e., sampling from schools, gyms, different age groups, and different genders).

The interesting finding of our study is the higher BED observed among the male participants. The importance of this finding is highlighted knowing that most studies of eating disorders perform on girls and data on eating disorders in boys is lacking (Striegel-Moore et al., 2009). The increasing prevalence of eating disorders among boys may be due to the influence of social media during this decade which altering the concepts of beauties, especially regarding body image. This may have increased the drive for a muscular body in boys, and drive for thinness in girls which increase the body image pressure on both genders. This may have also increased the sociocultural pressure on boys as well as girls. But the boys may react differently to compensate for the body image pressure. They may change their dietary habits and cheat meals; especially they may consume a high calorie and high protein diet which may predispose them to binge-eating, and/or compensatory behaviors such as heavy exercise, or purging. While the social pressure and negative body image in girls may lead to restricting dietary calorie intake and predispose them to anorexia nervosa and/or bulimia nervosa. Garrusi, Baneshi, and Pakgohar (2016) in another study with a sample of 433 high school boys reported that about 15% of boys had at least one eating disorder (Garrusi et al., 2016). However, the reported prevalence in our study is much lower. The most diagnostic tools are gender-biased regarding eating disorders (for example amenorrhea criteria for the diagnosis of anorexia nervosa). So we believe that the reported prevalence may be the tip of the iceberg. In our study, among eating and feeding disorders, boys more frequently showed the manifestation of BED and

then respectively, bulimia nervosa of low frequency and/or limited duration, atypical anorexia, bulimia nervosa, purging disorder, while observing the signs of anorexia nervosa was so rare.

While many studies have reported the eating disorder is a culture related phenomenon but Abdollahi and Mann (2001) concluded that changing the environment does not affect on the prevalence of eating disorder by comparison of eating disorders among Iranian women resident in Iran and immigrants to the United States (Abdollahi & Mann, 2001). In our study, the prevalence of all types of eating disorders in urban areas of Iran was almost three times more in comparison to rural areas (1.01 vs. 0.38, respectively). This reflects the role of sociodemographic varieties in eating disorders.

In our study, the co-occurrence of disordered eating with any kind of psychiatric disorder was 54.43%. Near to our estimation, researchers in Spain found that adolescents with eating disorders have 63% comorbidity with other psychiatric disorders (Rojo-Moreno et al., 2015). In Swanson et al. (2011) study, 55.2% of those with anorexia, 88% of those with bulimia, and 83.5% of those with binge-eating showed at least one other psychiatric comorbidity. Anxiety disorder, specific phobia, and major depressive disorder were the most observed comorbidities in Swanson et al. (2011) survey. Knowing that the duration of the disease may influence on the complexity and severity of comorbid disorders, the comorbidities may increase by age and the participants in Swanson et al. (2011) survey aged more than the participants in our survey. The most comorbid disorders in our study were obsessive–compulsive disorder (20.25%), agoraphobia (20.25%), depressive disorder (16.46%), and social phobia (10.13%). Obsessive–compulsive disorder, and depression in relation to body shape are interpersonal or intrinsic leading factors in the etiology of eating disorders (Ahmadi et al., 2013; Ahmadi, Keshavarzi, Mostafavi, & Bagheri Lankarani, 2015; Keshavarz et al., 2018) while agoraphobia and social phobia reflects the influence of extrinsic pressure on the person and indicates another contributing factor for incidence of eating disorders. It seems that paying attention to these comorbidities is important in preventing and treating the feeding and eating disorders.

Despite attempts to evaluate eating disorders and its predictors, most of them were restricted to small local studies or limited to the schools or fitness centers level or they have performed by self-reported questionnaires or they were confined to the female population. The strength of this study was that it was a large scale national survey performed among both genders with the diagnostic interview according to the DSM IV criteria. Additionally, we have reported the psychiatric comorbidities using the K-SADS-PL. Our study illustrates the general pattern of feeding and eating disorders by a valid and accurate diagnostic instrument among Iranian children and adolescents.

5 | LIMITATIONS

The design of the study was cross-sectional so the causality cannot be concluded. The age range of the participants in our study was limited to 6–18 years old and could not be generalized to the adult population. Besides, we customized the diagnostic criteria of DSM-5 feeding and eating disorders from the validated DSM-IV K-SADS-PL applied criteria. Unfortunately, The K-SADS-PL IV did not include the "BED" directly. However, we had gathered the criteria A1, A2, D, and E (i.e., rule out of BN and AN). These available criteria cover the essential features of BED. Hence, we decided to report the participants suspected to have BED rather than those with full criteria (Maybe the better way of reporting the participants with "BED" in our study is: "participants suspected to have BED"). Additionally, our instrument was unable to evaluate the night eating syndrome. Furthermore, the data from 2 provinces (Ghom, and West Azarbaijan) of 31 provinces were not included in the analysis.

6 | CONCLUSIONS

The prevalence of different types of feeding and eating disorders, their correlates and psychiatric comorbidities were important findings of this survey. Older age and female gender were positive correlates and living in a rural area was the negative correlate in most kinds of feeding and eating disorders (in BED, being a male was a positive correlate). The most prevalent psychiatric comorbidities observed with feeding and eating disorders were obsessive–compulsive disorder, social phobia and agoraphobia and depressive disorder. It is suggested that researchers and health policymakers pay special attention to the pattern of the feeding and eating disorders, especially among boys, and to comorbidities and predisposing factors.

6.1 | Recommendations for future research

Based on our experience in this large scale survey we could suggest using the valid an update tools such as DSM-5 K-SADS-PL for diagnosis of feeding and eating disorders. Furthermore, due to gender-bias in some diagnostic tools, we suggest using an additional valid tool for screening the eating disorders, such as muscle dysmorphia (bigorexia), and Avoidant Restrictive Food Intake Disorder (ARFID) among boys. Additionally, we could suggest including boys as well as girls in feeding and eating studies especially cohort studies and clinical trials. Besides, the results of this study could be used in estimation of burden of feeding and eating disorders.

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CONFLICT OF INTEREST

The authors declare no potential conflict of interest.

DATA AVAILABILITY STATEMENT

Data availability statement: we confirm data availability on demand of reviewers

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