

The impact of the prolonged COVID-19 pandemic on adolescents with eating disorders: a follow-up study from Türkiye

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ABSTRACT

Background. At the onset of the pandemic, we conducted a study on adolescents with eating disorders (EDs) and found no deterioration in ED symptoms. The objective of this subsequent study was to conduct a follow-up evaluation of the same cohort and investigate the consequences of the prolonged pandemic.

Methods. This longitudinal study was conducted one year after the first study between May 2021 and June 2021 with 37 adolescents aged 12-18 years (pre-existing EDs). The reassessment included an evaluation of sociodemographic and clinical characteristics, the impact of pandemic-related restrictions on ED behaviors, well-being, and quality of life. All the participants underwent a re-administration of the ED examination questionnaire (EDE-Q), Beck Depression Inventory, the State Anxiety Inventory for Children, and the Maudsley Obsessive Compulsive Inventory.

Results. No significant difference was observed in the EDE-Q scores or the ED examination questionnaire scores between the initial (T1) and subsequent (T2) study. The ED-related quality of life was seen to have slightly improved in the later stage. While depression (T1: 18, T2: 15, $p=0.883$) and obsession scores (T1: 11, T2: 14, $p: 0.536$) showed no disparity between the studies, anxiety scores (T1: 38, T2: 43, $p:0.011$) exhibited a significant increase.

Conclusions. Consistent with the early phase, no exacerbation of ED symptoms in adolescents was observed during the later stages of the pandemic. Close clinical monitoring during the pandemic might have been protective against the deteriorating effects of the pandemic. During social isolation, it is important to monitor adolescents with EDs continuously for depression and anxiety.

Key words: COVID-19, late-phase, eating disorders, adolescent, anxiety.

Towards the end of 2020, a third of the general population reported symptoms of anxiety and depression.¹ Despite the decrease in general pediatric presentations during the period of COVID-19 restrictions, the number of presentations at mental health clinics increased.²

The COVID-19 pandemic also negatively affected the mental health and well-being of adolescents, who are physically and mentally in transition and therefore, a vulnerable group.³ Many studies on adolescent mental health during the COVID-19 pandemic have drawn attention to the increase in post-traumatic stress disorder, depressive and anxiety symptoms associated with the pandemic.^{4,5} It has been shown that individuals with pre-existing psychopathology may have been at

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Received 7th Oct 2023, revised 1st Dec 2023, 12th Jan 2024,
11th Feb 2024, accepted 12th Feb 2024.

higher risk for the psychological effects of the pandemic.¹ Patients with eating disorders (EDs) are reported to be among the most vulnerable groups.^{1,6}

When the literature is examined; restrictions in the provision of health services, social isolation, more exposure to social media, stress due to quarantine, anxiety and increased family conflict led to an increase in the restrictive behaviors of adolescents with EDs. During the pandemic along with negative changes in mood, there was also an increase in binge-eating episodes and vomiting behaviors.⁷⁻¹⁰ Adolescence is a dynamic transitional period in which both physical and psychosocial development continue. In this period, peer relations, social activities and appearance can be at the forefront. It is also a period in which conflicts of opinion with family members can often be seen. For these reasons, the increase in restrictions and decrease in social activities, closure of schools, spending more time at home with family members in adolescent ED patients during the pandemic may cause adolescents who are already a vulnerable group, to be affected more negatively.^{11,12} In a study of adolescents with a mean age of 14.6 years, it was suggested that the COVID-19 pandemic was the main trigger for approximately half of newly diagnosed ED patients.¹³ Several studies have reported the worsening effect of the pandemic on EDs in adolescents and adults during the early stages of the pandemic.^{10,14,15}

During the early stages of the pandemic (May 2020-June 2020), we conducted a study to evaluate the impact of restrictions on adolescents diagnosed with EDs and identify the factors predicting ED attitudes.¹⁶ The study included 38 adolescents with a mean age of 15.12 ± 1.56 years (range=12-18 years) who had been diagnosed with EDs according to DSM-5 diagnostic criteria, mostly (68.4%) restrictive type AN, within the year before the pandemic. The study revealed no negative effects of the restrictions on EDs. Instead, 42.1%

of the participants showed an improvement in ED symptomatology, and 36.8% reported no change. The study also revealed that depression had the highest predictive value for ED behavior during the pandemic. Similarly, most other studies investigating the effect of COVID-19 on EDs were conducted in the early stages of the pandemic in adults. However, more data are needed on the impact of the prolonged pandemic on EDs, especially in the adolescent age group. The objective of this subsequent study was to conduct a follow-up evaluation of the same cohort and investigate the impact of the prolonged pandemic on EDs.

Methods

Participants and procedure

Hacettepe University İhsan Doğramacı Children's Hospital is a tertiary healthcare institution in Türkiye. Outpatient follow-up of adolescents with EDs is conducted in the adolescent medicine and the child and adolescent psychiatry clinics.

This subsequent study re-evaluated the same group of adolescents (n=38) between the ages of 12-18 years who had been diagnosed with EDs according to the DSM-5 criteria prior to the pandemic, one year after their initial evaluation. Ethics committee approval was obtained from Hacettepe University Clinical Research Ethics Committee (GO 2021/08-14). The adolescents who participated in the initial study and their parents were contacted by phone and invited to participate in the current study either in person or online. Thirty-seven (97.3%) of the adolescents volunteered to participate in the current study. Those who preferred face-to-face participation (n:13) completed the questionnaires themselves in the waiting room at the adolescent medicine clinic. Those who preferred online participation (n:24) completed the questionnaires online. Informed consent was obtained from all the participating adolescents and their families.

The time periods were defined as follows:

T0: Time of ED diagnosis

T1: Initial study- between May 2020 and June 2020, early stages of the pandemic

T2: Current study- between May 2021 and June 2021, later stages of the pandemic

Pandemic conditions in Türkiye during the study

The participants have been under medical and psychosocial follow-up with a family-based approach for EDs, starting from their diagnosis until the onset of the pandemic. During the early stages of the pandemic, at T1, there was a curfew for adolescents under the age of 20, schools were closed, students participated in online lessons and stay-at-home regulations were enacted in Türkiye.¹⁷ As a result, while the appointments of medically stable ED patients were postponed to a later date, adolescents who were medically or mentally unstable were continued to be followed up. An adolescent medicine physician conducted patient follow-ups via telemedicine (phone calls) at regular intervals to inquire about meal plan compliance, compensatory behavior, and general health, and saw them in person if necessary. Patients who required medical assistance were given special permission to leave their homes during the curfew and were seen in the clinic. Psychiatric follow-ups were primarily conducted via telephone or online visits during the lockdown.

During the later stages of the pandemic, at T2, the isolation restrictions were lifted, enabling easier patient access to the hospital. Schools also started to provide some hours of face-to-face education, but this varied according to the number of weekly COVID-19 cases in the country.

Anthropometric and clinical data

The body height and weight measurements of the adolescents who completed the questionnaires face-to-face in the clinic were taken by the

clinic nurse. Body weight was measured using a portable electronic scale and height was measured with a portable stadiometer. The body height and weight information was obtained from the parents of the adolescents participating online. The measurements were taken by the parents at home using a digital scale. The parents of 5 adolescents did not wish to provide this information, so the current height and weight data were available for 32 adolescents. Body mass index (BMI) was then calculated by dividing body weight in kilograms by the square of the height in meters. BMI z scores and target weight percentages were calculated by adjusting for CDC cards and age.¹⁸ The clinical information of the patients was retrieved from their medical files and from the hospital's electronic records. Age, gender, family structure, ED type, age at diagnosis of ED, measurements in T0, T1, T2, height, weight and BMI, remission status, duration of disease, duration of clinical follow-up, use of psychotropic medications, and hospitalizations of medically unstable patients were recorded.

For AN, patients were considered to be in medical remission if they had achieved their target weight, were consuming sufficient calories for their age and sex, and had not engaged in compensatory behaviors for the past three months. For BN, patients were considered to be in medical remission if they had not experienced binge-eating episodes and had not engaged in compensatory behaviors for the past three months.

Measurement tools

The impact of the pandemic on ED behavior

The questions developed by the researchers in the first study were asked again to evaluate the impact of the later stages of the COVID-19 pandemic on ED symptomatology, eating behaviours, diet adherence, diet compliance, whether meal plans had caused any struggles with parents, newly developed psychiatric symptoms, and healthcare service utilization. The adolescents were asked to rate the

difficulties in dietary compliance for the last month in the categories of none/somewhat, medium, or very difficult. The responses of the adolescents in the early and later stages were compared. The effectiveness of in-person and telemedicine visits were also compared in the current study.

The impact of pandemic on daily routines

The adolescents were asked how they felt about not going to school in person, the difficulty of staying at home, their screen time, and the time they spent on hobbies. They were asked to rate the difficulty of not attending school in person and staying at home as moderately difficult or extremely difficult. This study also evaluated sleep patterns. It was asked if there was a change in sleep duration, if the use of electronic devices affected sleep, and if the quality of sleep was poorer than it was before the pandemic.

The impact of the pandemic on well-being and quality of life

This section aimed to evaluate the overall well-being of the adolescents during the pandemic, and was assessed in the same way as in the first study by asking the dimensions of the improvement criteria for ED, previously stated in a qualitative study by de Vos et al.¹⁹ Emotional, psychological, and social well-being items with self-adherence dimensions that seem to be related to well-being were selected in both studies and were adapted to 11 questions on a three-point Likert-type scale. In addition, two questions were asked to assess quality of life (QoL) in the past month. The first aimed to assess the overall QoL "Evaluate your quality of life in the last month", while the second aimed to assess the ED-related QoL "Evaluate your health and health-related quality of life due to an eating disorder in the past month". The participants were shown a Likert scale of 1 to 5 represented by drawings of facial expressions, ranging from very bad to very good. Higher points were evaluated as a higher QoL.

The Eating Disorders Examination Questionnaire (EDEQ)

The Eating Disorders Examination Questionnaire (EDE-Q) is a self-reported ED assessment scale²⁰ formed of 28 items in 4 subscales of restriction, concerns related to eating, concerns related to body shape, and concerns about weight, reflecting the severity of symptoms of ED psychopathology. There are also 3 open-ended questions to support a diagnosis of binge-eating disorder. The points for the responses to the items in each subscale are totaled and divided by the number of items to give a total score for the subscale. The total points for the 4 subscales are then totaled and divided by 4 to give an overall scale score. Higher total scale points indicate an increased severity of ED. Individuals with an overall global scale score of >2.3 are evaluated as having clinical ED behaviour.²¹ A score of >4 points is suggestive of severe ED behaviour.^{22,23} In our study, patients were evaluated according to their overall global scale score (> 2.3). The validity and reliability studies of this scale for use with Turkish adolescents were performed by Yucel et al.²⁴ The number of items in the Turkish form and the subscales are the same as the original. The internal consistency coefficient has been found to be 0.93 for the whole scale, and ≥ 0.70 for each of the subscales.

Beck Depression Inventory (BDI)

The BDI was developed by Beck et al. in 1961 to measure the behavioural findings of depression in adolescents and adults.²⁵ The scale consists of 21 items, each scored between 0 and 3 points. The patients are instructed to mark the statement which best describes their status. The total points are evaluated as 0-9: minimal, 10-16: mild, 17-29: moderate, and 30-63: severe symptoms. The validity and reliability studies of the BDI in Turkish were performed by Teğin (1980) and Hisli (1988) and a cutoff value of 17 has been accepted.²⁵⁻²⁷

The State Anxiety Inventory for Children (SAI)

This scale was developed by Spielberger to measure individual differences when there is a predisposition to anxiety.²⁸ The State Anxiety Inventory (SAI) consists of 20 multiple choice questions and children are requested to evaluate how they feel "at that moment". The 20 items of this scale aim to evaluate feelings related to state anxiety such as tension, irritability, fussing, and nervousness. The presence or absence of these feelings is marked and scored from 1 (absent) to 3 (very much). The validity and reliability studies of this scale in Turkish were performed by Özusta, and the Cronbach alpha coefficient was found to be 0.82 for the SAI.²⁹

The Maudsley Obsessive Compulsive Inventory (MOCI)

This scale was developed by Hodgson and Rachman³⁰ to investigate the type and severity of obsessive compulsive symptoms. Each item on the scale is answered as true or false, with "true" responses scored as 1 point and "false" responses as 0. The points for each item are totaled to give an overall total score. A higher total score indicates an increase in obsessive-compulsive symptoms. The validity and reliability studies of this scale in Turkish were performed by Erol and Savaşır.³¹

Evaluation of the data and statistical analysis

Data obtained in the study were analyzed statistically using IBM SPSS vn.23 software (Statistical Package for the Social Sciences). In the descriptive analyses, continuous data were stated as mean±standard (SD) values if data were normally distributed and as median (minimum-maximum), first and third quartile values if distribution was not normal. Categorical data were stated as number (n) and percentage (%). Conformity of the quantitative data to normal distribution was assessed with the Shapiro Wilk test and visual methods (histogram, box-line graph). When the assumption of normal distribution was not met, non-parametric statistical tests were used in the group comparisons. To determine whether

there was a difference or not in quantitative variables, the Wilcoxon Matched Two Samples Test was used for two dependent groups and for more than two groups, the Friedman test was applied. To determine any difference between two dependent percentages, the McNemar test was used and for more than two dependent percentages, the Marginal Homogeneity test. If the comparisons of more than two groups were found to be significant ($p<0.05$), the groups that caused the difference were evaluated using post-hoc tests of Post Friedman and the Dunn-Bonferroni test. Relationships between continuous variables were examined with the Spearman correlation coefficient as distribution was not normal. As the mean age of the study participants was not correlated with the depression, anxiety, obsession, and EDEQ total points, no correction according to age was applied.

Linear regression analysis was performed to determine the factors affecting the severity of ED symptoms. By examining the assumptions (residual normality, no problems of multicollinearity), a model was obtained which was clinically appropriate and met the assumptions. A value of $p<0.05$ was accepted as statistically significant in all the tests.

Linear regression analysis was applied to examine the predictive power of the variables for the EDEQ total scores. In this analysis, the variables with correlation coefficients >0.5 including BDI (T2), MOCI (T2), SAI (T2) scores, BMI Z score value (T1), and the 'Family conflict concerning the meal plan within the last month' (T2) were taken as predictors. Multicollinearity was determined between the BDI (T2), MOCI (T2), and SAI (T2) scores, so of these three variables, only the SAI (T2) was included in the final regression analysis model because SAI (T2) had the highest β coefficient in the regression analysis performed one by one, and only SAI had a statistically significant difference between T1 and T2 evaluations. Finally, the SAI (T2) scores, the BMI z score value (T1) and the 'Family conflict concerning the meal plan within the last month' (T2) were taken as predictive variables.

Results

Anthropometric and clinical data

The mean age of the adolescents was 15.6±1.6 years at T0, 16.52±1.68 years at T1, and 17.9±1.68 years at T2. The majority of the participants were female (n:35, 94.6%). The most common diagnosis was Anorexia Nervosa-Restricting Type (AN-RT) (n: 25, 67.5%), followed by AN-Binging-Purging (AN-BP) (n:5, 13.5%), Atypical AN (n:3, 8.1%), Bulimia Nervosa (BN) (n:3, 8.1%), and Unspecified Feeding or Eating Disorder (UFED) (n:1, 2.7%). Due to the medical instability of the participants, the hospitalization numbers were 7 (18.9%) in T0, zero in T1, and 2 (5.4%) in T2. At T2, 31 (83.7%) adolescents were given selective serotonin reuptake inhibitor, 5 (13.5%) atypical antipsychotics, and 1 (2.7%) methylphenidate, which was similar to T1 (p>0.05).

The BMI Z score and target weight percentage values of the patients diagnosed with AN-RT and AN-BP are presented in Table I. Friedman test overall p values for BMI Z score and target goal weight percentage, respectively p=0.018, p=0.006. The BMI Z-score values at T2 were not significantly different from those at T1 and T0 (p>0.999, p=0.80, respectively). The mean BMI Z score value was significantly higher in T1 compared to T0 (p=0.031). The target weight percentage values at T2 were found to

be significantly higher than at T0 (p=0.011) and there was no significant change compared to T1 (p>0.999).

From T0 to T1, among 38 adolescents, 6 (15.7%) were discharged from ED follow up. From T1 to T2, among 37 adolescents 12 (32.4%) were discharged from ED follow up (p=0.065). A total of 25 (67.6%) adolescents were under regular clinical follow-up. The mean follow-up period of 12 adolescents who discontinued treatment was 27.7±16.8 months (0.9-65.3 months), and 7 (58.3%) of them were in medical remission when they left the treatment. Of the 25 patients who were under regular follow-up, 12 (48%) were in medical remission at T2 (p=0.255).

The impact of the pandemic on self-reported ED related behavior, psychiatric symptoms, family conflict, and healthcare utilization

The effect of the pandemic on ED symptomatology is presented in Table II, with no significant change observed in the ED behaviours from T1 to T2. There was a decrease of approximately 2.7% in compliance with the diet from T1 to T2, but the difference was not significant (p=0.869). In T1, 73.4% of the adolescents stated that they did not have newly developed psychiatric symptoms, and this rate was not statistically significant compared to T2 (54.1%) (p=0.144). Conflict with family was similar in T1 and T2; with 70.3% of adolescents

Table I. Comparisons of the weight and BMI values of the patients diagnosed with AN.

Characteristics	Time of diagnosis (T0) (n=31)	Early stage of pandemic (T1) (n=31)	Later stage of pandemic (T2) (n=26)	P
BMI Z score				
Median	-1.83	-0.92	-0.79	T0-T1: 0.031
1st-3rd quartile	-2.62 - -0.80	-1.90- 0.03	-1.74- -0.23	T0-T2: 0.800
Min-max	-5.14- 1.06	-3.91- 1.03	-3.90- 1.10	T1-T2: >0.999
Target goal weight percentage (%)				
Median	79	84.0	88.0	T0-T2: 0.011
1st-3rd quartile	75.0 -90.0	79 -90	79- 90	T1-T2: >0.999
Min-max	60.0 -110	65.0- 110.0	65.0-106	

Evaluation periods: T1 defines the period between May 2020 and June 2020, T2 defines the period between May 2021 and June 2021.

AN: Anorexia Nervosa, BMI: Body mass index, min: minimum, max: maximum, n:number, (Friedman test)

Table II. The impact of the pandemic conditions on eating disorder symptomatology.

Symptomatology		Early stage of pandemic (T1) n(%)	Later stage of pandemic (T2) n(%)	P
Were you able to comply with your meal plan during the pandemic?	Never/Rarely	17(45.9)	16(43.2)	0.869
	Sometimes	6(16.2)	9(24.3)	
	Often/Always	14(37.8)	12(32.4)	
Did the lockdown negatively affect your access to ED healthcare?	Never/Rarely	17(45.9)	27(73.0)	0.005
	Sometimes	11(29.7)	9(24.3)	
	Often/Always	9(24.3)	1(2.7)	
Have you had any new psychiatric symptoms during this period?	Never/Rarely	27(73.4)	20(54.1)	0.144
	Sometimes	6(16.2)	12(32.4)	
	Often/Always	4(10.8)	5(13.5)	
Did you experience conflict with your parents due to eating during the lockdown?	Never/Rarely	26(70.3)	23(62.2)	0.317
	Sometimes	6(16.2)	7(18.9)	
	Often/Always	5(13.5)	7(18.9)	
During the lockdown, I spent less time thinking about my weight/appearance	Disagree	17(45.9)	20(54.1)	0.564
	Somewhat agree	10(27.0)	7(18.9)	
	Totally agree	10(27.0)	10(27.0)	
During the lockdown, I spent less time tracking my weight	Disagree	16(43.2)	16(43.2)	>0.999
	Somewhat agree	6(16.2)	6(16.2)	
	Totally agree	15(40.5)	15(40.5)	
During the lockdown, I spent less time doing things to try and control my weight	Disagree	13(35.1)	13(35.1)	0.336
	Somewhat agree	11(29.7)	6(16.2)	
	Totally agree	13(35.1)	18(48.6)	

Evaluation periods: T1 defines the period between May 2020 and June 2020, T2 defines the period between May 2021 and June 2021.

ED: Eating Disorder, (Marginal homogeneity test)

in T1 and 62.2% in T2 ($p=0.317$) reporting not experiencing conflict with the family. Difficulty in accessing healthcare in person increased and 73% of the participants stated that the tele-health service was more feasible than in-person clinic visits.

The impact of pandemic on daily routines

When screen time within the last month was examined at T1 and T2, an increase of 5.4% was found ($p=0.819$). Having to remain at home was reported as very difficult by 13 (35.1%) at T1, and by 16 (43.2%) at T2 ($p=0.715$). While not being able to go to school was reported as very difficult by 2 (5.4%) at T1, this number increased to 14 (37.8%) at T2 ($p=0.023$). A significant decrease was determined in time spent doing hobbies in the last month from T1 to T2 (45.9%

and 21.6%, respectively, $p=0.040$). Almost half of the adolescents ($n=16$, 43.2%) reported that their sleep quality had deteriorated. Seventeen (45.9%) reported increased screen time before bedtime, and 14 (37.8%) stated it takes longer to fall asleep.

The impact of the pandemic conditions on well-being and quality of life

Considering the responses to the general quality of life (QoL); at T1 32.4% stated good, 32.4% neither good nor bad, and 35.1% bad, and these rates were 18.9%, 54.1% and 27%, respectively, at T2 ($p=0.255$). Considering the ED-related QoL; at T1, 37.8% stated good, 27% neither good nor bad, and 35.1% bad, and at T2, these rates were 51.4%, 32.4% and 16.2%, respectively ($p=0.134$). The mean general QoL scores were

3.00±1.20 at T1, and 3.00±0.97 at T2 ($p=0.603$). The mean ED-related QoL scores were 3.00±1.18 at T1, and 4.00±1.09 at T2 ($p=0.056$). The results of the impact of the pandemic conditions on well-being and quality of life are shown in Table III.

EDEQ, MOCI, BDI and SAI results

According to the global score cut-off value for the EDEQ (>2.3), ED behaviour was present in 17 (45.9%) patients at T1, and in 14 (37.8%) at T2 ($p>0.999$). No statistically significant difference was determined between the EDEQ total and subscale points between T1 and T2 (Table IV). No statistical difference was seen between the MOCI and BDI scale scores at T1 and T2, while the SAI scores increased significantly at T2 ($p=0.536$, $p=0.883$, $p=0.011$, respectively). The results of the MOCI, BDI, and SAI are presented in Table IV.

Variables predicting the EDEQ total score

According to the cutoff value for the BDI, the risk of depression was determined in 20 (54.1%) patients at T1, and in 18 (48.6%) at T2 ($p=0.180$). The median depression score of the adolescents was 29 (IQR:7-38) for those under clinical follow-up, and 14 (IQR:6-26) for those who had discontinued the treatment ($p=0.240$). These values for the anxiety scores were 43 (31-48) and 42.5 (34-45.5), respectively ($p=0.737$).

Linear regression analysis was applied to examine the predictive power of the variables for the EDEQ total scores at T2. (Table V)

The SAI (T2) scores explained 39% of the EDEQ total score ($R^2:0.397$, $p<0.001$). When the BMI Z score value (T1) was added, this rate increased to 49.9%, and when the variable "Family conflict concerning the meal plan within the last month" was added, the rate reached to 57.5% (Table VI).

Discussion

The aim of this longitudinal follow-up study was to re-evaluate adolescents with EDs one year after the first study during the prolonged

COVID-19 pandemic. To our knowledge, this is one of the few follow-up studies and the first to examine the factors predicting ED behavior and disordered eating in the same patient population.^{6,32,33} Consistent with the findings in the early stages, no increase was observed in the EDEQ scores later in the pandemic. In addition, while depression remained the most significant predictor for ED behaviour both in the early and later phases, anxiety showed a significant increase in the later phase and became the second most important predictor of ED behaviour.

In this study, participants reported that their ED symptomatology did not worsen in the later stages of the pandemic. Among our participants, 67.6% were followed up regularly by adolescent medicine and psychiatry clinics, suggesting that this follow-up may have had a protective effect against the aggravating effects of the pandemic. Another study³⁴, evaluated the symptoms of ED patients (mean age 27.6±8.45 years) before, during, and after quarantine. In that study, more than half of the patients were treated, and a small percentage of the patients did not receive treatment. About half of the treated patients reported improvement in ED symptoms during the quarantine period. On the other hand, 29% of those who did not receive treatment showed improvement after the quarantine period. Similar to our study, it was thought that being under treatment was associated with an improvement in ED symptomatology. In contrast to our study, a large-scale longitudinal study reported that women with EDs (mean age 32.1±8.73 years) who were asymptomatic at the initial stage of the pandemic relapsed within 6 months. However, less than 50% of participants were under clinical follow-up and the follow-up lasted only 6 months. The study also linked higher ED symptoms to anxiety, which aligns with our findings.³² Another study³⁵ conducted in 2020 also reported worsening of ED behaviors in both patients with ED (aged >18 years) and the general population. However, this study lacked information on patients' clinical follow-up and higher rates of comorbid psychiatric disorders, such as depression and anxiety

Table III. The impact of the pandemic conditions on well-being and quality of life.

Impact items		Early stage of pandemic (T1) n(%)	Later stage of pandemic (T2) n(%)	P
I understand the value of being healthy	Disagree	3 (81.0)	6 (16.2)	0.617
	Somewhat agree	13 (35.1)	9 (24.3)	
	Totally agree	21 (56.8)	22 (59.5)	
My self-confidence has increased	Disagree	13(35.1)	12(32.4)	0.866
	Somewhat agree	12(32.4)	15(40.5)	
	Totally agree	12(32.4)	10(27.0)	
I accepted myself as I am	Disagree	14(37.8)	11(29.7)	<0.001
	Somewhat agree	14(37.8)	14(37.8)	
	Totally agree	9(24.3)	12(32.4)	
I realized I am in control	Disagree	3(81.0)	3(8.1)	0.819
	Somewhat agree	12(32.4)	13(35.1)	
	Totally agree	22(59.5)	21(56.8)	
A new era has begun in my life	Disagree	8(21.6)	8(21.6)	0.857
	Somewhat agree	14(37.8)	15(40.5)	
	Totally agree	15(40.5)	14(37.8)	
I realized I have the right to decide and choose	Disagree	11(29.7)	7(18.9)	0.384
	Somewhat agree	13(35.1)	16(43.2)	
	Totally agree	13(35.1)	14(37.8)	
I feel more mature	Disagree	11(29.7)	4(10.8)	0.020
	Somewhat agree	12(32.4)	13(35.1)	
	Totally agree	14(37.8)	20(54.1)	
My goals in life have changed	Disagree	9(24.3)	10(27)	0.369
	Somewhat agree	19(51.4)	12(32.4)	
	Totally agree	9(24.3)	15(40.5)	
I realized that I have things to do with the society I live in	Disagree	10(27)	11(29.7)	0.879
	Somewhat agree	12(32.4)	9(24.3)	
	Totally agree	15(40.5)	17(45.9)	
I started to understand my family better.	Disagree	11(29.7)	8(21.6)	0.286
	Somewhat agree	17(45.9)	16(43.2)	
	Totally agree	9(24.3)	13(35.1)	
My family has started to better understand me	Disagree	16(43.2)	12(32.4)	0.450
	Somewhat agree	11(29.7)	15(40.5)	
	Totally agree	10(27.0)	10(27.0)	
General quality of life (QoL)	Good	2(32.4)	7(18.9)	0.255
	Neither good nor bad	12(32.4)	20(54.1)	
	Bad	13(35.1)	10(27)	
ED-related QoL	Good	14(37.8)	19(51.4)	0.134
	Neither good nor bad	10(27)	12(32.4)	
	Bad	13(35.1)	6(16.2)	

Evaluation periods: T1 defines the period between May 2020 and June 2020, T2 defines the period between May 2021 and June 2021.

ED: Eating disorder, QoL: quality of life, (Marginal homogeneity test)

Table IV. Comparisons of the EDEQ Total Points and Subscale Points and MOCI, BDI and SAI scores in the earlier and later periods of the pandemic.

Scales	Early stage of pandemic (T1) n(%)	Later stage of pandemic (T2) n(%)	P
EDE-Q Total points			0.587
Median	1.5	1.6	
1st-3rd quartile	0.1-3.9	0.7-3.4	
min-max	0-5.2	0.1-5.4	
Restraint subscale			0.829
Median	1	1	
1st-3rd quartile	0-3	0-2.6	
min-max	0-3	0-6	
Eating concerns subscale			0.961
Median	0.8	1	
1st-3rd quartile	0.2-2.8	0-2.6	
min-max	0-4.4	0-4.6	
Shape concern subscale			0.509
Median	2.3	1.8	
1st-3rd quartile	0.38-5	1.2-4.7	
min-max	0-6	0-6	
Weight concern subscale			0.350
Median	1.8	2	
1st-3rd quartile	0.4-4.4	1.2-3.8	
min-max	0-6	0-6	
MOCI			0.536
Median	11	14	
1st-3rd quartile	9-18	10-19	
min-max	2-29	0-31	
BDI			0.883
Median	18	15	
1st-3rd quartile	9-25	6-34	
min-max	2-53	0-51	
SAI			0.011
Median	38	43	
1st-3rd quartile	30-43	33-47	
min-max	21-55	26-53	

Evaluation periods: T1 defines the period between May 2020 and June 2020, T2 defines the period between May 2021 and June 2021.

min: minimum, max: maximum, BDI: Beck Depression Inventory, EDEQ: Eating Disorders Evaluation Questionnaire, MOCI: Maudsley Obsessive Compulsive Inventory, SAI: State-Anxiety Inventory for Children, (Wilcoxon Test)

were reported.³⁶ A meta-analysis exploring the relationship between depression and EDs in adults revealed that EDs are a risk factor for depression and, thereby contributing to the result.³⁷

These studies suggest that adult patients with EDs were affected more negatively than adolescents in regard to ED symptomatology while in social isolation.³⁸ We believe that this is because adolescents adapted better to

Table V. Simple linear regression models for predicting the total EDEQ points in the later period of the pandemic.

Model	Predictive variable	β	Standardised β	T	p	95% Confidence Interval
1	MOCI	0.09	0.408	2.64	0.012	0.023 - 0.173
2	BDI	0.06	0.64	4.94	<0.001	0.039 - 0.093
3	SAI	0.12	0.63	4.80	<0.001	0.072- 0.17

Linear regression analysis dependent variable: EDEQ total points, MOCI: Maudsley Obsessive Compulsive Inventory, BDI: Beck Depression Inventory, SAI: State-Trait Anxiety Inventory for Children. (linear regression analysis)

Table VI. Multiple linear regression models predictive of the EDEQ

Predictive variable	B	Standardised β	t	p	95% confidence interval
SAI	0.092	0.468	3.981	0.000	0.045 - 0.139
BMI Z score at T1	0.191	0.387	3.576	0.001	0.082 - 0.299
Family conflict concerning the meal plan within the last month	0.410	0.331	2.823	0.008	0.115 - 0.706

Linear regression analysis, dependent variable: EDEQ total points, SAI: State Anxiety Inventory for Children, BMI: body mass index. (linear regression analysis)

their meal plans, as they most likely ate under the supervision of their families during the pandemics. Studies have shown that eating with the family significantly influences ED recovery.³⁹ In our study, contrary to some literature findings⁴⁰, over half of the adolescents reported no family conflict concerning their meal plans, which likely contributed to the stable EDEQ scores observed. The increased time spent with family during the pandemic may have fostered greater support and understanding among family members, and increased parental involvement in the treatment. Family based therapy (FBT) is the most effective and evidence-based treatment for adolescents with EDs and its main components include meal support, family control and close monitoring of nutrition.⁴¹ Furthermore, the closure of schools may have reduced peer communication, which could have prevented some deterioration in body perception due to fewer instances of visual scrutiny by others.

Although many studies have shown negative effects of the pandemic on the course of AN^{9,42,43}, there are also studies suggesting that AN patients experienced fewer negative effects compared to other EDs, and that the impact of quarantine varied based on ED subtypes.^{44,45} In a study comparing AN and BN patients, BN patients reported experiencing more negative

effects during the pandemic.^{6,45} The more positive outcomes of adolescents with AN were attributed to their development of better coping strategies and having better access to healthcare services. Although the majority of our patients were AN, it was not possible to compare the EDEQ scores across different ED types due to the small number of patients.

We have shown that, depression was the most significant predictor of ED behavior in the early stages of the pandemic.¹⁶ However, in this study we observed that, while depression remained the most important predictor, its predictive power decreased over time. Conversely, the predictive power of anxiety increased significantly during the later stages. The relationship between anxiety and ED has been demonstrated in many studies⁴⁵⁻⁴⁷, but there is limited information on their association during the later stages of the pandemic. A study by Cascino et al.⁴⁸ found that anxiety showed the most significant increase over time during the pandemic, while binge-eating and vomiting returned to pre-pandemic levels. The effects of the pandemic on mental health seem to have become more pronounced in later periods. Factors like reduced social isolation, eased restrictions, fear of contracting the virus and changes in routine activities may have contributed to the continuation of the depression and the increase in anxiety in the

late period. In another longitudinal study of adolescents without ED, a significant increase in anxiety and depression was found in the later period compared to the early period⁴⁹, indicating that the effects on mental health are likely to persist in the prolonged COVID pandemic term, beyond its immediate effects. The increase in anxiety among adolescents with EDs may also be influenced by changing social determinants of health over time. During the later phase of the pandemic, there was more face-to-face education compared to the initial stage, along with the onset of exams, potentially contributing to increased academic anxiety. In addition, increasing inflation and the emergence of economic difficulties may have further increased anxiety levels.³⁹

The strength of this study was that it was one of the few longitudinal studies evaluating the effects of the prolonged pandemic on adolescents with EDs. However, there were also some limitations, primarily the relatively small sample size and the inability to perform subgroup analyses by ED subtypes. In addition, body weight and BMI data for adolescents who prefer online participation were based on parental statements and were not available for five adolescents. The results of this study cannot be generalized to all adolescents with EDs, especially to those diagnosed during the pandemic, as all of our patients were diagnosed before the pandemic. Furthermore, while the impact of the pandemic on eating disorders in adolescents has been studied, it is important to consider various factors beyond the pandemic itself. These factors may include school-related anxiety, communication patterns with parents, family dynamics, and the severity of the eating disorder prior to the pandemic. Consequently, it is not feasible to isolate the sole effect of the pandemic.

In conclusion, the results of this study demonstrated that in the later stage of the pandemic, just as in the early stage, depression was the most powerful predictor of ED symptomatology, and anxiety showed a

significant increase in the later period. In the presence of strong environmental stress factors and prolonged social isolation, it is important to closely monitor adolescents with EDs for depression and anxiety, and be aware of those in need of family support and mental healthcare services. Being under regular clinical monitoring before and during the pandemic might have been protective against the deteriorating effects of the pandemic for adolescents with EDs, in addition to the possible positive effects on FBT and closer meal support by parents.

Ethical approval

Ethics committee approval was received for this study from the Ethics Committee of Hacettepe University (Protocol number: GO 2021/08-14). Informed consent was obtained from individuals who participated in this study.

Author contribution

The authors confirm contribution to the paper as follows: Study conception and design: SA. Data collection: ŞET. Analysis and interpretation of results: SA, KN, MPK. Draft manuscript preparation: ŞET, SA. All authors reviewed the results and approved the final version of the manuscript.

Source of funding

The authors declare the study received no funding.

Conflict of interest

The authors declare that there is no conflict of interest.

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